

**Best
Available
Copy**

AD 729215

TERMINAL FORECAST REFERENCE FILE

OFFUTT AFB



Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
Springfield, Va. 22151

SEPTEMBER 1971

Security Classification

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

DD FORM 1473
1 NOV 65

UNCLASSIFIED

Security Classification

KEY WORDS

Offutt Air Force Base

WT

Security Classification

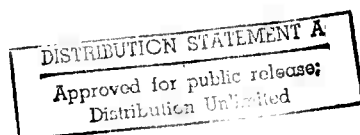
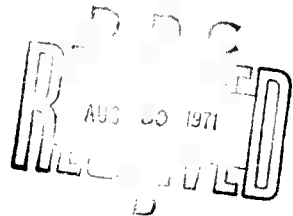
TERMINAL FORECAST REFERENCE FILE

PART I

LOCATION AND TOPOGRAPHY

	PAGE
SECTION A LOCATION	I-A-1
SECTION B TOPOGRAPHY	I-B-1
SECTION C POLLUTANTS	I-C-1
SECTION D INSTRUMENTATION	I-D-1
SECTION E OBSERVING LIMITATION	I-E-1

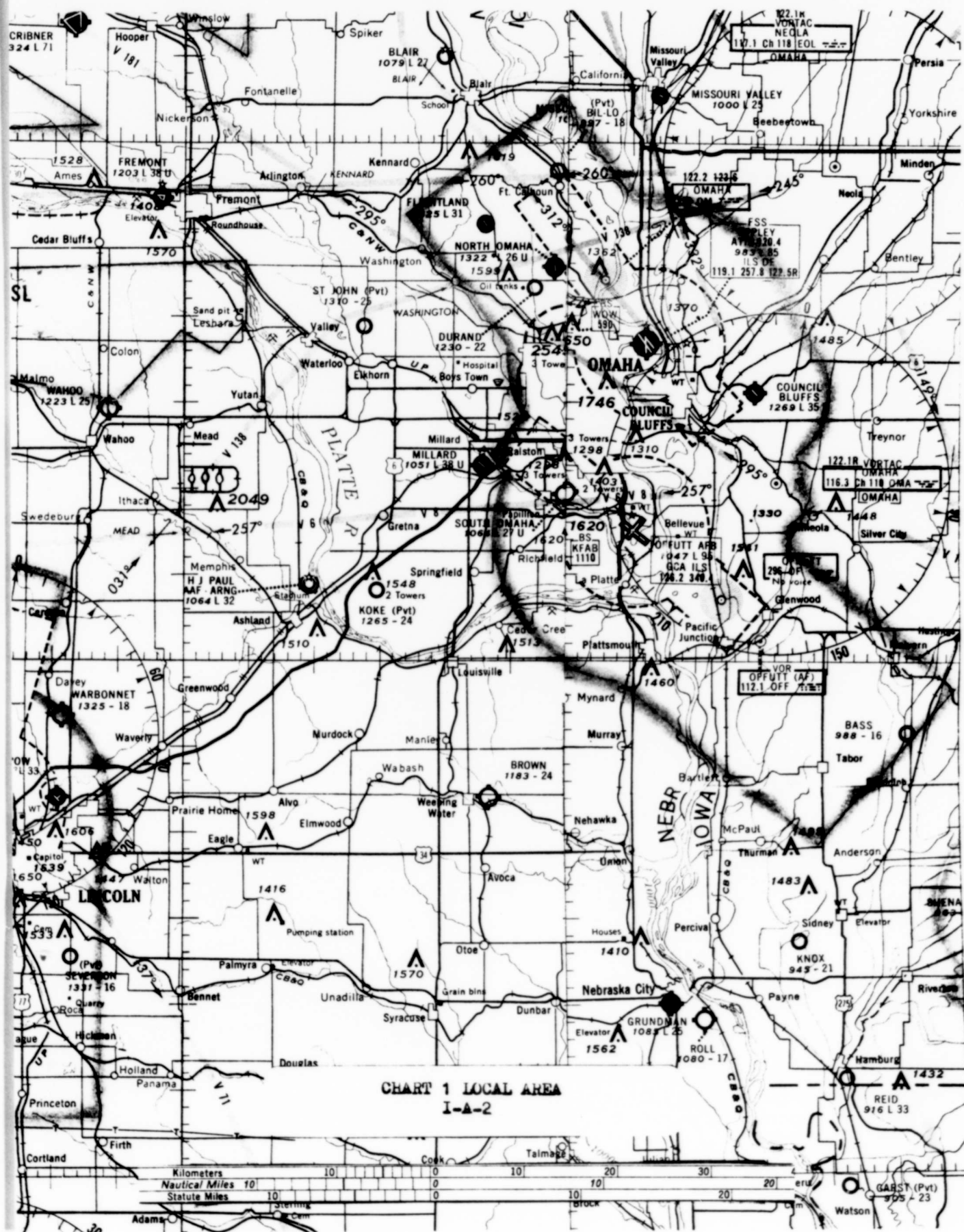
Details of Illustrations in
this document may be better
studied on microfiche



SECTION A LOCATION

Offutt AFB is located in east central Nebraska at geographical coordinates $41^{\circ} 07' N$ and $95^{\circ} 55' W$ and is on Central Standard Time (GMT-6). The runway direction is northwest (300°) southeast (120°) and is situated approximately one and one-half miles west of the Missouri River and three miles north of the Platte River. The two rivers join about four miles south of the southeast end of the runway.

Omaha, population 390,000, lies ten miles north and the city of Bellevue, population 25,000, adjoins the base to the northeast. See Chart 1 (Local Area).



SECTION B TOPOGRAPHY

The base is located on relatively low land between the Missouri River and the Papillion Creek. The runway slopes up from 970 feet southeast to 1050 feet northwest where it is higher than the immediate terrain.

The Missouri River Valley slopes up generally from the southeast to northwest with elevations at St Joseph, Mo of 625 feet; Omaha, Neb 950 feet; Sioux City, Ia 1080 feet; and Huron, SD 1250 feet. There is a ridge between Huron and Minneapolis, Minn with maximum heights to 1800 feet which lowers to 1600 feet between Omaha and Des Moines and to 1000 feet in the Lamoni, Ia - Kansas City, Mo area. To the west the terrain starts to rise just west of the Platte River reaching an elevation of 1800 feet 80 miles west of Offutt. A ridge runs southeastward from just south of North Platte, Neb towards Kansas City with elevations to 1800 feet southwest of Offutt.

As the topographic map shows, 120° - 160° is upslope while winds from 330° - 360° are neutral or slightly downslope. Winds from 160° - 330° and 360° - 120° are downslope.



NOT REPRODUCIBLE

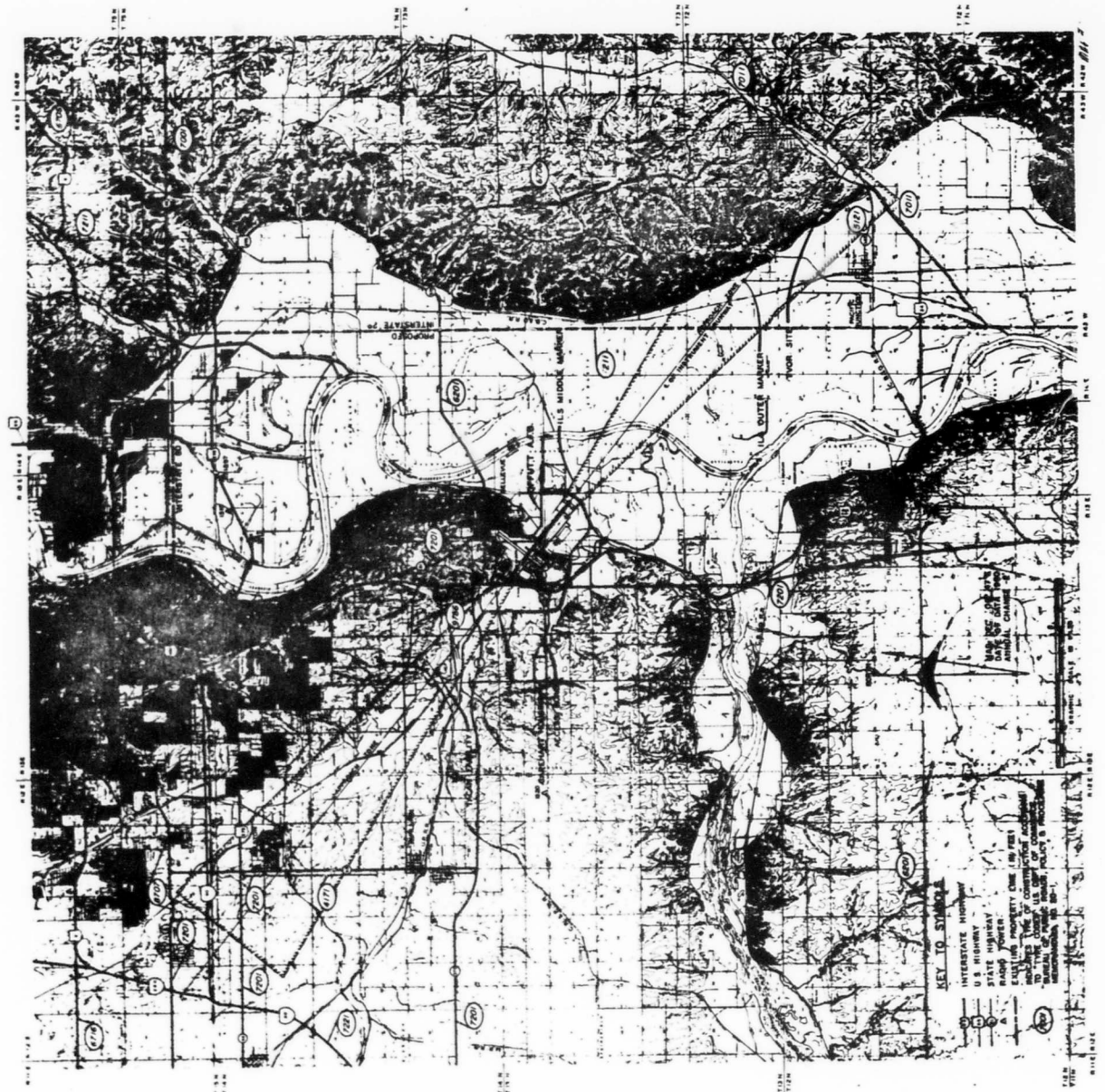


CHART 3 TERRAIN PHOTOGRAPH
I-B-3

SECTION C POLLUTANTS

Pollution by smoke is at times a contributing factor to reduced visibility but rarely the major cause of visibility below three miles. Omaha is the major source of smoke over the general area. Locally, the Allied Chemical Plant located one mile south of Offutt is the major source (See Chart 4). The OPPD power plant which is one mile northeast of the base is another source but usually involves relatively high level smoke or contributes to the formation of river fog. The Allied Chemical Plant contributes to the fog intensity with weak southerly or southwesterly flow. On one rare occasion, smoke reduced the visibility to less than one half mile. This was over a snow cover with a strong surface inversion, surface temperature near zero, and calm surface winds. Smoke collected in the low areas after sunset and reduced the visibility to 1/16 mile between 2300 and 0100 LST. By 0200 LST the visibility was above one mile and no further decrease in visibility was noted.



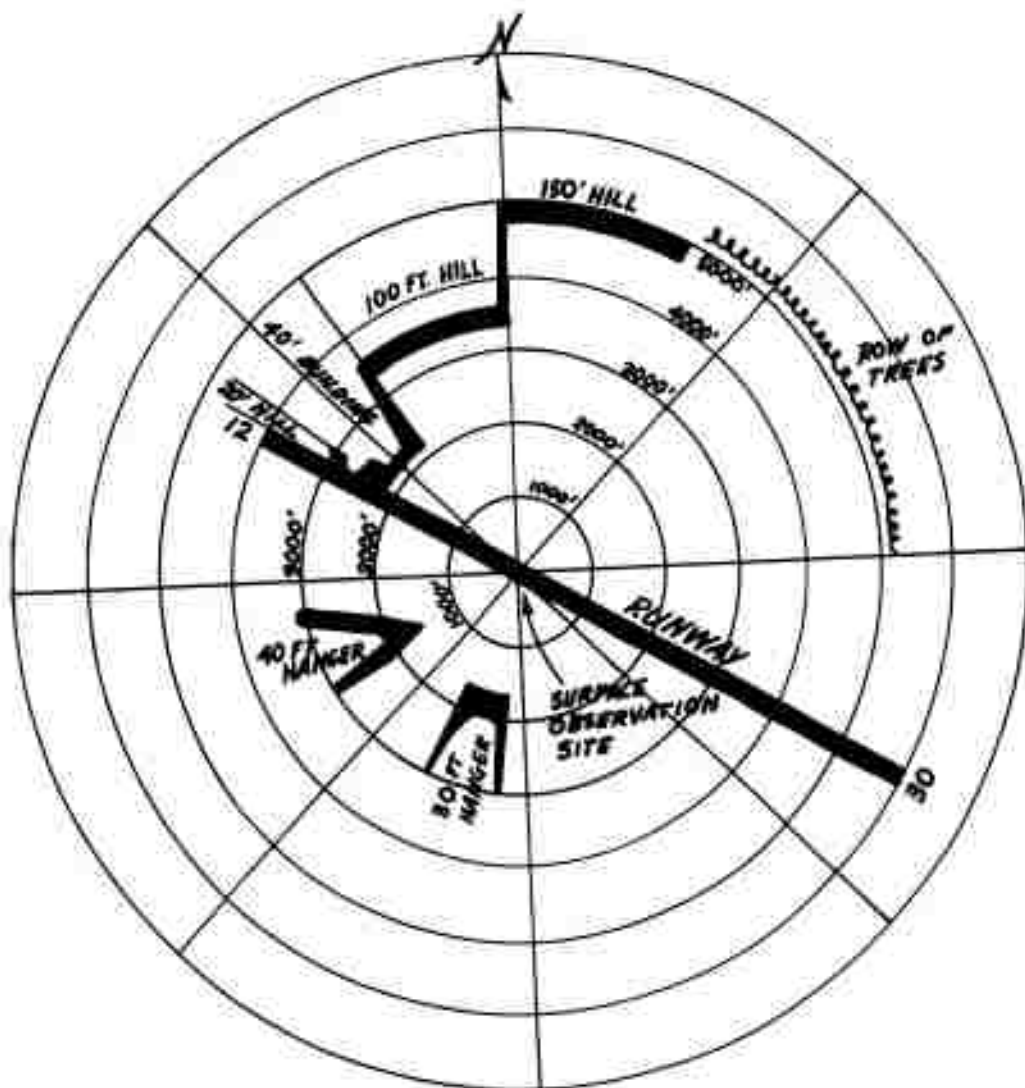
SECTION D INSTRUMENTATION

TYPE	SENSOR	READOUT	REMARKS
WIND	GMQ11 Dual	Ob Site Base Wea Control Twr GCA RAPCON	Sensor at SE end in slight hollow. Sen- sor at NW end partly sheltered by buildings
CLOUD HEIGHT	GMQ13 Dual	Ob Site	Max height 3900'
VISIBILITY	GMQ10 Dual	Ob Site	FMN1 RVR
TEMPERATURE HUMIDITY	TMQ11	Ob Site	
PRESSURE	ML512 ML102 ML563	Ob Site	
PRECIPITA- TION	ML17	Ob Site	
STORM RADAR	FPS77	Base Wea	
RADAR CLOUD DETECTION	TPQ11	Base Wea	

NOT REPRODUCIBLE

SECTION E OBSERVING LIMITATION

The representative observation site is located near the center of the runway in a slight hollow. The building is constructed three feet off the ground such that a standing observer has his eye level at about nine feet. Local terrain and construction limits his field of view in several sectors and limits his visibility check points. (See Chart 6)



HORIZON VISIBILITY OBSTRUCTIONS
FROM
SURFACE OBSERVATION SITE

CHART 6 OBSERVING LIMITATIONS
1-E-2

TERMINAL FORECAST REFERENCE FILE

PART II

CLIMATOLOGY

		PAGE
SECTION A	REFERENCES	II-A-1
SECTION B	CLIMATIC BRIEF	II-B-1
SECTION C	THUNDERSTORMS	II-C-1
SECTION D	WINDS	II-D-1
SECTION E	FLYING WEATHER	II-E-1
SECTION F	EQUIVALENT CHILL	II-F-1
SECTION G	MEAN STATION PRESSURE	II-G-1

SECTION A REFERENCES

The following list of references is provided to indicate what is immediately available in the way of climatic aids in the weather station. Most of the information is too bulky to reproduce in this paper and summarization is not meaningful. A brief review of all listed aids by each forecaster is suggested for overall understanding of their content.

1. DIURNAL HEATING CURVES
Location: Top shelf of forecasters cabinet
Description: Hourly heating and cooling by ceiling, wind direction, and wind speed
2. WIND STRATIFIED PERSISTENCE PROBABILITY
Location: Top shelf of forecasters cabinet
Description: Ceiling-visibility persistence probability by month, initial time, and wind direction
3. WIND PERSISTENCE PROBABILITY
Location: Top shelf of forecasters cabinet
Description: 3-6-12-24 hour persistence probability for TAF times by categories of wind speed and direction
4. CEILING-VISIBILITY CATEGORY FREQUENCY
Location: Top shelf of forecasters cabinet
Description: Percent frequency of observed ceiling-visibility categories by hour and wind direction
5. DETERIORATION PERSISTENCE PROBABILITY
Location: Top shelf of forecasters cabinet
Description: 1 through 24 hour probability of a lower final category
6. ONSET-DURATION TABLES
Location: Top shelf of forecasters cabinet
Description: Ceiling-visibility category duration by month and onset time
7. UNIFORM SUMMARY OF RAWINSONDE OBSERVATIONS
Location: Top drawer of forecasters files
Description: Contains winds aloft data, height summary, temperature-humidity summary

8. **REVISED UNIFORM SUMMARY OF SURFACE WEATHER OBSERVATIONS**
Location: Top drawer of forecasters files
Description: Contains frequency data for weather phenomena including category data for surface winds, ceilings and visibility
9. **RELATED CEILING-VISIBILITY OBSERVATIONS FOR OFFUTT, LINCOLN, AND LITTLE ROCK**
Location: Surface records storage cabinet
Description: Relates above parameters by month and hour
10. **OFFUTT PRESSURE OBSERVATIONS**
Location: Surface records storage cabinet
Description: Statistics relating to pressure altitude, station pressure, and sea level pressure by month and hour
11. **OFFUTT DEGREE DAYS**
Location: Surface records storage cabinet
Description: Data based on 65°F threshold by month
12. **JANUARY WIND CHILL**
Location: Surface records storage cabinet
Description: Category probability by hour
13. **24 HOUR PRECIPITATION AMOUNTS**
Location: Surface records storage cabinet
Description: Frequency distributions for categories by year and month
14. **FREQUENCY DISTRIBUTION OF PEAK GUSTS**
Location: Surface records storage cabinet
Description: Determined for specific categories by year and month
15. **DAILY MAX-MIN TEMPERATURE FREQUENCIES**
Location: Surface records storage cabinet
Description: Occurrence for max (Jun-Sep) and min (Dec-Feb) by year
16. **1200Z SNOW DEPTH**
Location: Surface records storage cabinet
Description: Occurrence by year and month
17. **24 HOUR SNOWFALL**
Location: Surface records storage cabinet
Description: Occurrence by year and month
18. **DAILY MAX-MIN OF RELATIVE HUMIDITY**
Location: Surface records storage cabinet
Description: Occurrence by year and month

19. 3WMM 105-6
Location: Surface records storage cabinet
Description: Monthly climatological wind factors for selected great circle routes
20. WEATHER PARAMETERS FOR FOG CONDITIONS
Location: Surface records storage cabinet
Description: Frequency at 1800L of temperature, dew point, temperature-dew point spread, wind direction and wind speed
21. MONTHLY TAKE OFF AND CLIMB DATA
Location: Under plexiglass at forecasters work table
Description: Provides monthly mean temperature, pressure altitude, climb winds, climb deviation, and 3000 ft temperatures
22. PROBABILITY OF CEILING-VISIBILITY FOR GIVEN WEATHER CONDITIONS
Location: Posted above forecasters work table
Description: Gives probability of categories A-E for given weather conditions

SECTION B CLIMATIC BRIEF

The following AWS Climatic Brief for Offutt AFB has been extracted from AWSP 105-4 Vol II for easy reference.

AWS CLIMATIC BRIEF

OFFUTT AFB/OMAILA, NEBRASKA

PERIOD: 1948-67

WBAN # 14949

WMO # 72554

Prepared by ETAC (DEC 1970) N 41 07 W 95 55

ELEVATION: 1057 ft STN LTRS: KOFF

[illegible]

REMARKS

(RECORDS UPDATED THRU DEC 1970)

RUSSWO POR: Hrly Obs: Jan 48 - Aug 67

Daily Obs: Jan 48 - Jun 65, Aug-Dec 65

NOTE: *DATA NOT AVAILABLE. †LESS THAN 0.5 DAY, 0.5 OR 0.05 INCH, OR 0.5 PERCENT (%) AS APPLICABLE.

FLYING WEATHER (% FREQ)	HOURS (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	EYR
CIG less than 3000 feet and/or VSBY less than 3 miles	00 - 02	24	24	23	15	11	8	5	6	10	9	17	22	15	
	03 - 05	20	28	27	18	16	10	9	9	14	11	17	25	18	
	06 - 08	29	30	31	23	19	12	12	12	17	16	19	26	21	
	09 - 11	27	31	30	24	20	15	11	12	17	16	21	27	21	
	12 - 14	24	27	29	21	17	13	9	10	14	13	17	23	18	
	15 - 17	21	26	26	16	12	9	5	6	11	10	15	21	15	
	18 - 20	20	24	23	13	10	6	4	4	10	8	14	21	13	
	21 - 23	22	23	22	13	10	6	4	4	8	9	14	21	13	
	ALL HOURS	24	27	26	18	14	10	7	8	13	11	17	23	17	20
CIG less than 1500 feet and/or VSBY less than 3 miles	00 - 02	17	17	14	9	7	5	3	4	7	6	10	14	9	
	03 - 05	18	20	17	10	11	6	7	7	10	7	12	17	12	
	06 - 08	20	22	21	13	12	7	9	9	13	11	13	19	14	
	09 - 11	21	22	19	12	10	7	5	7	10	9	14	18	13	
	12 - 14	16	16	16	9	6	4	2	3	6	7	10	14	9	
	15 - 17	14	15	15	7	4	3	2	2	4	4	8	11	7	
	18 - 20	14	13	13	7	3	2	2	2	4	5	8	11	7	
	21 - 23	16	15	13	7	4	4	2	2	5	6	8	13	8	
	ALL HOURS	17	18	16	10	7	5	4	4	8	7	10	15	10	20
CIG less than 1000 feet and/or VSBY less than 2 miles	00 - 02	12	11	9	6	4	3	2	2	4	3	8	9	6	
	03 - 05	13	14	11	7	6	4	5	5	7	5	8	11	8	
	06 - 08	16	15	15	8	7	4	5	6	8	7	9	13	9	
	09 - 11	17	14	13	7	5	3	2	4	5	6	9	12	8	
	12 - 14	12	11	10	5	3	2	1	1	4	3	5	9	6	
	15 - 17	10	10	9	4	1	1	#	1	2	3	5	8	5	
	18 - 20	10	11	9	4	2	1	1	1	2	3	5	8	5	
	21 - 23	12	11	8	5	2	2	1	1	3	4	6	9	5	
	ALL HOURS	13	12	11	6	4	3	2	3	4	4	7	10	6	20
CIG less than 200 feet and/or VSBY less than 1/2 mile	00 - 02	2	3	2	#	#	#	0	#	#	1	1	2	1	
	03 - 05	3	3	1	1	1	1	1	#	1	1	2	3	2	
	06 - 08	5	4	2	1	1	1	1	1	1	2	3	3	2	
	09 - 11	3	2	2	#	#	#	#	#	0	#	1	2	1	
	12 - 14	2	1	1	#	0	#	#	#	0	0	1	1	1	
	15 - 17	1	1	1	#	0	#	0	0	0	0	#	1	#	
	18 - 20	1	2	1	#	#	0	#	#	0	#	#	2	1	
	21 - 23	2	2	1	#	0	0	#	0	#	#	1	3	1	
	ALL HOURS	2	2	1	#	#	#	#	#	#	1	1	2	1	20

TABLE 1

II-B-2

CLIMATIC BRIEF

TAF TIPS

Explanation of Data Tables

FLYING WEATHER

Frequency of occurrence of each of 5 categories is given. The sum of 5 category values for each month is 100, since observations which meet criteria of two categories are considered only in category with more-restricted limits. Values were computed from RUSSWO, Part D, and are compatible with values obtained from PP tables, though some differences occur because of different periods of record.

Caused by: Relative importance of the 3 components contributing to the "CIG a/o VSBY" values in categories D, C, B and A were computed from RUSSWO, Part D, tables.

Peak Occur: Time of peak occurrence determined from PP tables and recorded as the center hour of 3 hour period (see LST & HRS Code).

Percy: Normal persistence was determined from PP tables by counting number of consecutive hours

	<u>LST & HRS Code</u>		
that initial category	00-02	01	- Dash indicates consecutive,
is the most likely or	03-05	04	equally likely periods.
the equally likely category	06-08	07	/ A slant indicates non-consecutive,
on each of the 8 monthly	09-11	10	equally likely periods.
pages. Values were	12-14	13	
ordered and two values	15-17	16	x Indicates no occurrence.
at each end of distribution	18-20	19	
deleted. An "x" indicates	21-23	22	
there was no occurrence			

of category on at least 3 of 8 pages, i.e., x-x-x-1-1-3-5-6, appears as x-3. In this case, Max Percy is 6 (hrs) and Time Max Percy is determined from page of PP table producing this 6 hour persistence.

VISIBILITY AND WEATHER CONDITIONS

Caused by: Relative importance of weather factors contributing to conditions noted immediately above. Their sum may exceed 100, since parameters may occur simultaneously.

SURFACE WIND DATA

Prevailing Direction: Prevailing direction was determined by inspection of "total 4 kts and over" column of Surface Wind pages of RUSSWO, Part C;

direction recorded is that of middle class of 3 adjacent classes producing largest frequency of occurrence. Percent frequency of speed criterion is the sum for the 3 classes used in determination of prevailing direction.

TAF TIPS FOR: OFFUTT AFB, NE

FLYING WEATHER (% frequency, all hours) (Source: RUSSWO, Part D; PP tables. POR Jan 48 - Aug 67)

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC YI

CATEGORY E (CIG \geq 10,000 ft and VSBY \geq 6mi)

CIG and VSBY	62.6	60.7	56.9	64.0	66.4	72.6	78.8	78.6	72.1	77.5	70.5	64.3	68
--------------	------	------	------	------	------	------	------	------	------	------	------	------	----

CATEGORY D (\leq 10,000/623000/3)

CIG a/o VSBY	13.2	12.9	16.7	18.1	19.2	17.6	13.9	13.6	15.1	11.1	12.8	12.3	14
Caused By	CIG Only	9.1	9.0	14.0	16.6	17.6	16.3	12.0	11.3	12.2	9.0	11.0	9.8
	VSBY Only	3.0	2.8	1.8	0.7	0.8	0.6	1.3	1.6	1.9	1.7	1.4	1.7
	CIG and VSBY	1.1	1.1	0.9	0.8	0.8	0.7	0.6	0.7	1.0	0.4	0.4	0.8
Peak Occurrence (LST)	16/22	07	16	16	16	16	07	04	07	07	07	07	07
Normal Persistency (hrs)	3-4	2-6	6-8	4-7	3-5	2-3	2-4	2-3	5-6	3-5	4	4-5	
Max Persistency (hrs)	8	9	10	8	6	5	5	7	10	5	6	6	
Time Max Percy (LST)	16	22	01	22	10	01	22	22	22	01/10	19	22	

TAF TIPS FOR: OFFUTT (Cont'd)

FLYING WEATHER (% frequency, all hours) (Source: RUSSWO, Part D; PP tables. POR Jan 48 - Aug 67)

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC YR

CATEGORY C ($\leq 3000/321000/2$)

Caused By	CIG a/o VSBY	11.7	14.3	15.9	12.4	10.8	7.1	5.1	5.1	8.4	7.1	9.7	13.5	10.1
	CIG Only	10.4	12.9	14.8	11.9	10.4	6.9	4.8	4.7	7.9	6.8	9.2	12.5	9.4
	VSBY Only	0.5	0.6	0.3	0.1	0.2	0.1	0.3	0.4	0.3	0.3	0.2	0.4	0.3
	CIG and VSBY	0.8	0.8	0.8	0.4	0.2	0.1	0.0	0.0	0.2	0.0	0.3	0.6	0.4
Peak Occurrence (LST)		04	10	13	10	10	10	13	13	10	13	13	13	
Normal Persistence (hrs)		6-8	7-8	7-15	8-15	6-12	4-7	4-10	4-5	8-12	5-10	7-15	9-11	
Max Persistence (hrs)		10	10	18	21	15	10	15	7	15	15	18	11	
Time Max Percy (LST)		19	01	19	19	22	01	22	19	19/22	22	16	16/19/22	

H-B-6

CATEGORY B ($\leq 1000/22200/1/2$)

Caused By	CIG a/o VSBY	10.1	10.1	9.2	5.2	3.4	2.5	3.0	2.5	4.2	3.8	5.8	7.9	5.5
	CIG Only	3.9	4.5	4.2	3.8	2.5	1.7	1.5	1.7	3.1	2.7	3.7	3.6	3.1
	VSBY Only	2.0	1.7	1.9	0.4	0.3	0.3	0.3	0.6	0.3	0.4	0.6	1.3	0.8
	CIG and VSBY	4.2	3.9	3.1	1.0	0.6	0.5	1.2	0.2	0.8	0.7	1.5	3.0	1.6
Peak Occurrence (LST)		10	10	07	07	07	07	07	07	07	10	10	07	
Normal Persistence (hrs)		10-12	11-12	7-11	6-15	3-8	3-15	1-4	2-8	5-12	5-10	7-12	8-15	
Max Persistence (hrs)		15	15	12	15	11	18	11	12	15	18	18	21	

TAF TIPS FOR: OFFUTT (Cont'd)

FLYING WEATHER (% frequency, all hours) (Source: RUSSWO, Part D; PP tables. POR Jan 48 - Aug 67)

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC YR

CATEGORY B (Cont'd)

Time Max Percy (LST) 10/13 19 19/22 13/16 22 19 22 19/22 16 16 16 16

CATEGORY A ($< 200/\frac{1}{2}$)

Caused By	CIG a/o VSBY	2.4	2.0	1.3	0.3	0.2	0.2	0.2	0.2	0.2	0.5	1.2	2.0	0.9
	CIG Only	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.1
	VSBY Only	1.0	0.9	1.0	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.8	0.4
	CIG and VSBY	1.0	0.9	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.7	0.9	0.4
Peak Occurrence (LST)		07	07	10	07	04/07	07	07	07	07	07	07	07	04
Normal Persistence (hrs)		2-4	2-5	1-3	0-2	X	X-1	X-0	0	X-0	0-1	4-9	1-4	
Max Persistence (hrs)		11	8	6	5	3	2	2	4	1	5	15	8	
Time Max Percy (LST)		22	01	04	19	04	01/04	07	04	07	22	13	22	

SECTION C THUNDERSTORMS

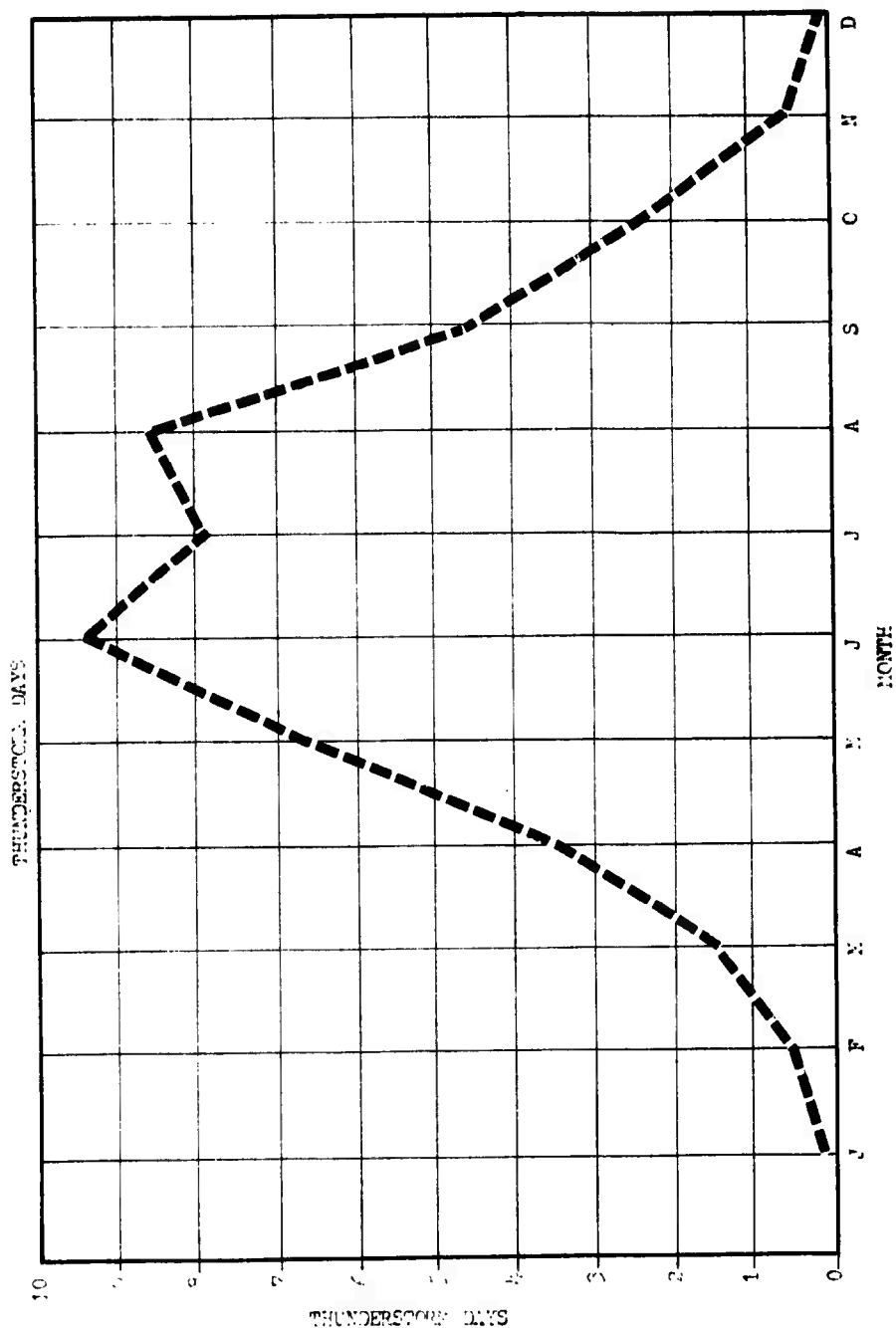
The following Tables and associated graphs are provided to acquaint the forecaster with preferred times and months of thunderstorm occurrence and their duration. Two additional graphs are provided relative to Tornado occurrence.

A quick review of the information will show that June is the preferred month for thunderstorm and tornado activity with the maximum per month and the longest duration. Additionally, it is evident that the evening hours (1900L to 0500L) show maximum activity.

LISTING OF NUMBER OF DAYS PER MONTH WHERE AT LEAST ONE THUNDERSTORM WAS REPORTED ON THE
RECORD OBSERVATION (17 YRS OF DATA)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1951	0	2	1	6	7	10	9	9	3	2	0	0
1952	0	0	1	3	8	12	8	14	2	0	1	0
1953	0	0	4	0	3	9	7	3	1	2	1	0
1954	0	1	1	7	5	6	7	15	6	5	0	0
1955	1	0	0	4	2	9	4	3	2	0	0	0
1956	0	0	0	2	3	7	7	9	4	3	0	0
1957	0	0	2	2	5	11	6	13	3	3	0	0
1958	0	0	0	7	4	4	14	4	5	2	0	0
1959	0	1	1	3	13	9	5	14	5	2	1	1
1960	0	0	1	1	7	11	5	10	4	2	0	0
1961	0	1	3	1	7	7	7	5	8	4	0	0
1962	0	2	2	2	13	6	9	9	6	1	0	0
1963	0	0	4	5	6	8	10	9	4	5	1	0
1964	0	0	0	5	10	12	10	8	5	3	2	0
1965	0	1	1	5	11	13	10	7	8	0	2	0
1966	0	1	1	1	8	10	7	6	5	1	1	0
1967	1	0	2	3	2	16	9	7	6	6	0	0
TOTAL	2	9	24	57	114	160	134	145	77	41	9	1
AVG	0.1	0.5	1.4	3.4	6.7	9.4	7.9	8.5	4.5	2.4	0.5	0.1

TABLE 2 TSTM DAYS
II-C-2



PERIOD OF RECORD: 1951-1967

CHART 1 TSTM DAYS
11-C-3

NUMBER OF THUNDERSTORM OBSERVATIONS PER MONTH (RECORD OBSERVATIONS ONLY) FROM 1951-1967

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1951	0	5	2	11	18	27	24	28	7	4	0	0
1952	0	0	1	3	16	46	14	36	3	0	1	0
1953	0	0	6	0	8	21	8	8	1	4	1	0
1954	0	4	1	14	17	18	13	48	9	11	0	0
1955	1	0	0	8	3	28	8	3	6	0	0	0
1956	0	0	0	4	7	20	14	24	10	5	0	0
1957	0	0	4	5	10	33	20	35	8	5	0	0
1958	0	0	0	16	7	7	42	11	19	3	0	0
1959	0	1	3	8	47	18	14	43	11	4	3	1
1960	0	0	1	1	18	25	13	26	8	4	0	0
1961	0	1	4	1	14	17	13	9	21	6	0	0
1962	0	2	3	2	40	9	29	19	12	1	0	0
1963	0	0	9	12	23	24	17	20	8	6	1	0
1964	0	0	0	23	27	43	40	25	20	3	4	0
1965	0	1	1	18	41	39	28	15	25	0	6	0
1966	0	1	1	2	15	32	24	15	8	3	1	0
1967	2	0	2	8	5	71	28	17	18	0	0	0
TOTAL	3	15	38	136	316	478	349	382	194	59	17	1
AVG	0.2	0.9	2.2	8.0	18.6	28.1	20.5	22.5	11.4	3.5	1.0	0.1

TABLE 3 TSTM OBS
II-C-4

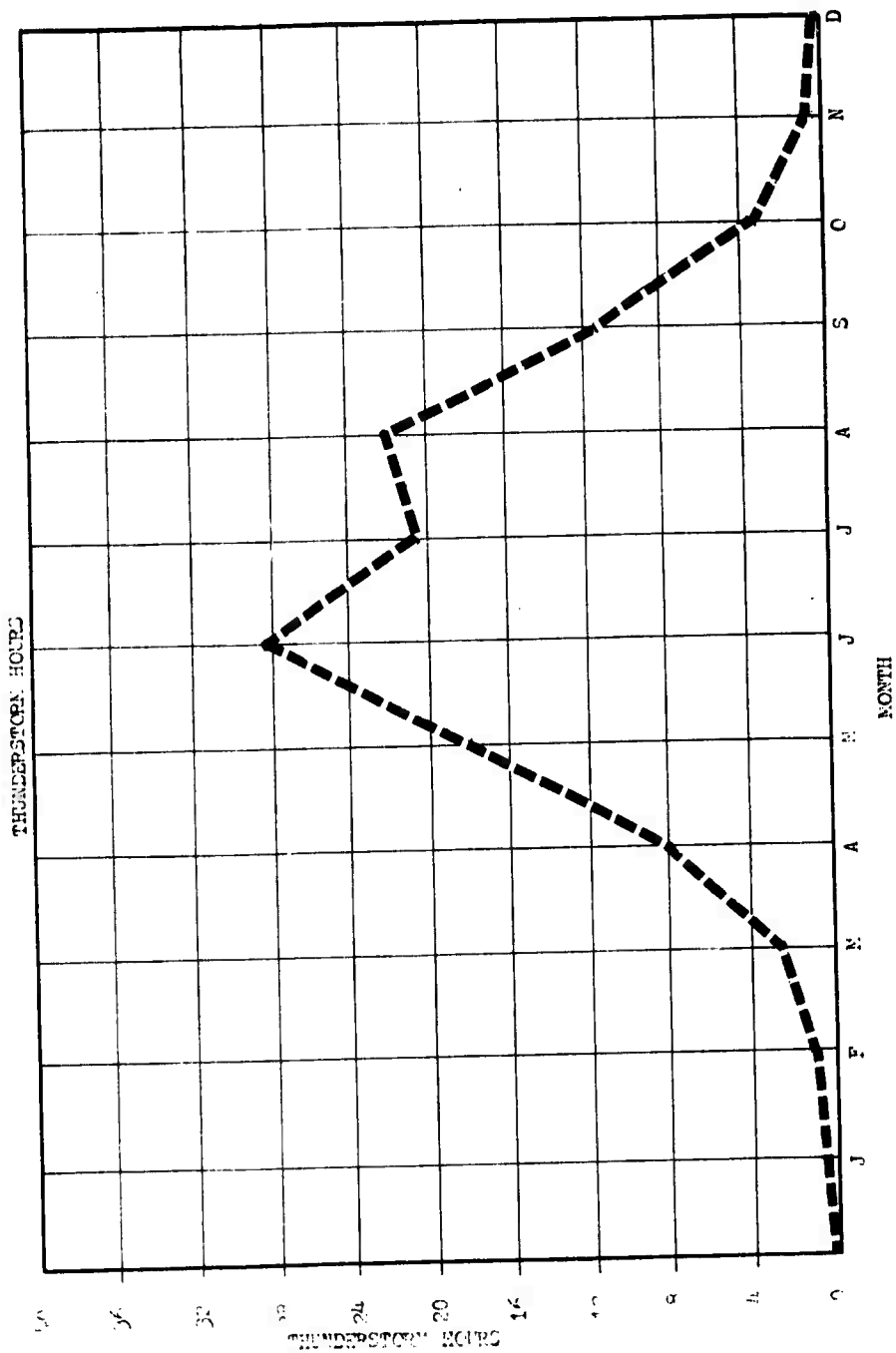


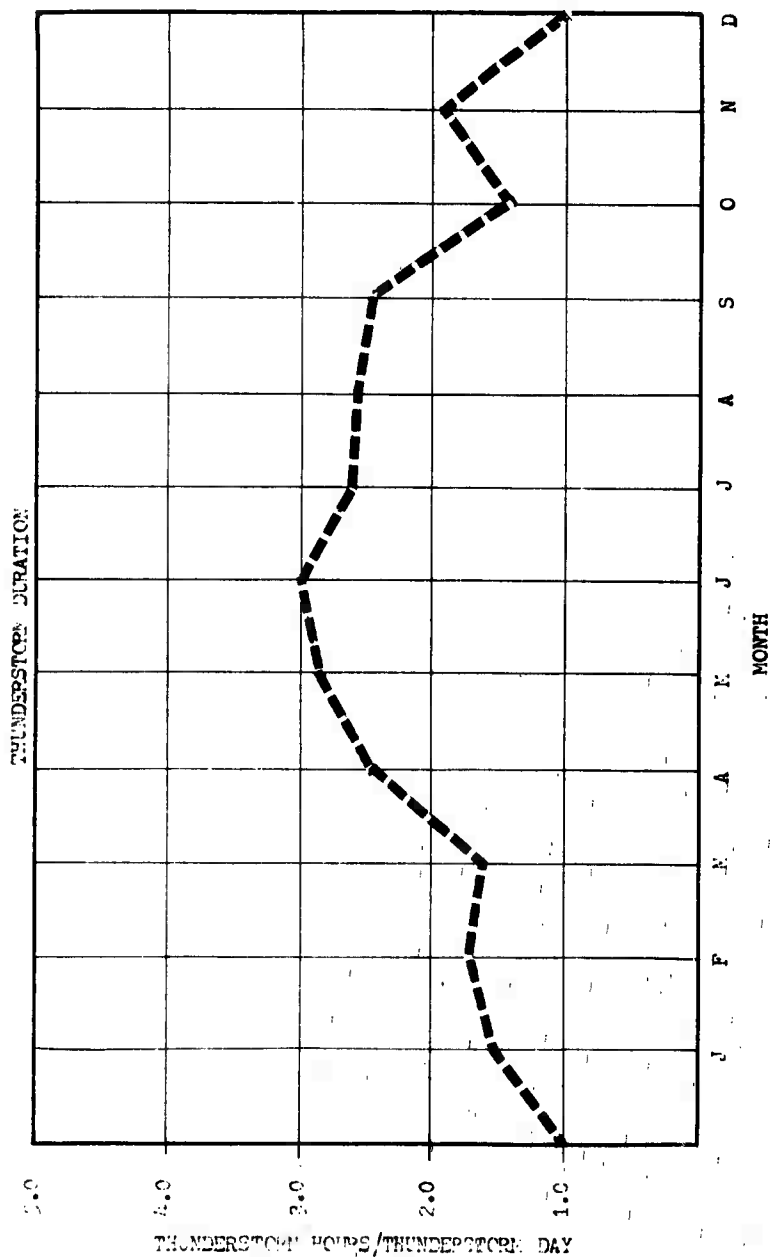
CHART 2 TSTM OBS
II-C-5

PERIOD OF RECORD: 1951-1967

AVERAGE NUMBER OF THUNDERSTORM HOURS PER THUNDERSTORM DAY

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TOTAL THUNDER HOURS	3	15	38	136	316	478	349	382	194	59	17	1
TOTAL THUNDER DAYS	2	9	24	57	114	160	134	145	77	41	9	1
MEAN DURATION (NUMBER OF HOURS DIVIDED BY NUMBER OF DAYS)	1.5	1.7	1.6	2.4	2.8	3.0	2.6	2.6	2.5	1.4	1.9	1.0

TABLE 4 TSTM HOURS
II-C-6



PERIOD OF RECORD: 1951-1967

CHART 3 TSTM HOURS
11-C-7

PERCENT OF TIME WITH THUNDERSTORMS: MEAN DIURNAL THUNDERSTORM DISTRIBUTION BASED ON THE
 PERCENTAGE OF TIME OBSERVED ON A RECORD OBSERVATION TO THE TOTAL NUMBER OF RECORD OBS. (17 YRS)

HOURL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
00	0.0	0.0	0.4	1.6	4.4	5.2	4.8	5.2	2.5	1.0	0.6	0.0
01	0.0	0.0	0.4	2.2	2.8	4.8	4.8	5.0	2.5	1.2	0.4	0.0
02	0.2	0.2	0.4	2.2	4.0	6.7	4.0	5.0	1.5	0.4	0.4	0.0
03	0.0	0.2	0.2	2.0	4.6	5.8	6.5	5.2	2.5	0.4	0.2	0.0
04	0.0	0.2	0.4	1.8	4.2	6.2	4.8	5.6	2.7	0.2	0.4	0.0
05	0.2	0.6	0.6	1.4	3.2	4.4	3.0	4.4	2.1	0.8	0.2	0.0
06	0.0	0.4	0.4	0.6	2.4	3.5	2.0	2.8	2.1	1.0	0.0	0.0
07	0.0	0.0	0.4	1.2	1.8	3.7	2.4	1.8	1.0	0.4	0.0	0.0
08	0.0	0.0	0.4	1.0	1.2	1.5	2.0	1.8	0.6	0.2	0.0	0.0
09	0.0	0.0	0.0	1.0	1.6	2.3	1.8	1.4	0.2	0.8	0.0	0.0
10	0.0	0.0	0.0	0.2	2.0	1.2	1.0	1.8	0.0	0.4	0.0	0.0
11	0.0	0.0	0.4	0.0	1.0	1.2	1.0	0.8	0.4	0.2	0.0	0.0
12	0.2	0.2	0.2	0.0	1.4	1.7	1.6	0.8	0.4	0.2	0.0	0.0
13	0.0	0.2	0.2	0.4	1.4	2.3	1.2	1.0	0.4	0.6	0.0	0.0
14	0.0	0.2	0.4	0.4	1.6	1.7	0.6	0.6	0.4	0.2	0.0	0.0
15	0.0	0.0	0.4	0.8	1.0	1.0	1.0	1.2	0.2	0.0	0.0	0.0
16	0.0	0.0	0.0	1.4	1.2	2.7	1.4	1.8	0.4	0.2	0.0	0.0
17	0.0	0.0	0.0	1.0	1.2	2.1	1.0	2.0	1.0	0.4	0.2	0.0
18	0.0	0.2	0.4	1.4	1.8	2.3	1.4	2.8	0.6	0.2	0.2	0.2
19	0.0	0.2	0.2	0.8	2.8	2.3	3.2	4.0	1.5	0.0	0.0	0.0
20	0.0	0.0	0.4	1.6	2.8	4.8	3.2	4.6	2.7	0.4	0.0	0.0
21	0.0	0.0	0.8	1.2	3.0	5.4	3.2	4.0	3.5	0.6	0.0	0.0
22	0.0	0.0	0.2	1.6	4.0	5.4	3.6	4.0	3.5	0.8	0.2	0.0
23	0.0	0.4	0.6	1.4	4.8	6.5	4.8	5.4	3.7	1.2	0.4	0.0
ALL HRS	0.0	0.1	0.3	1.1	2.6	3.5	2.7	3.1	1.5	0.5	0.1	0.0

TABLE 5 TSFM DISTRIBUTION
 II-C-8

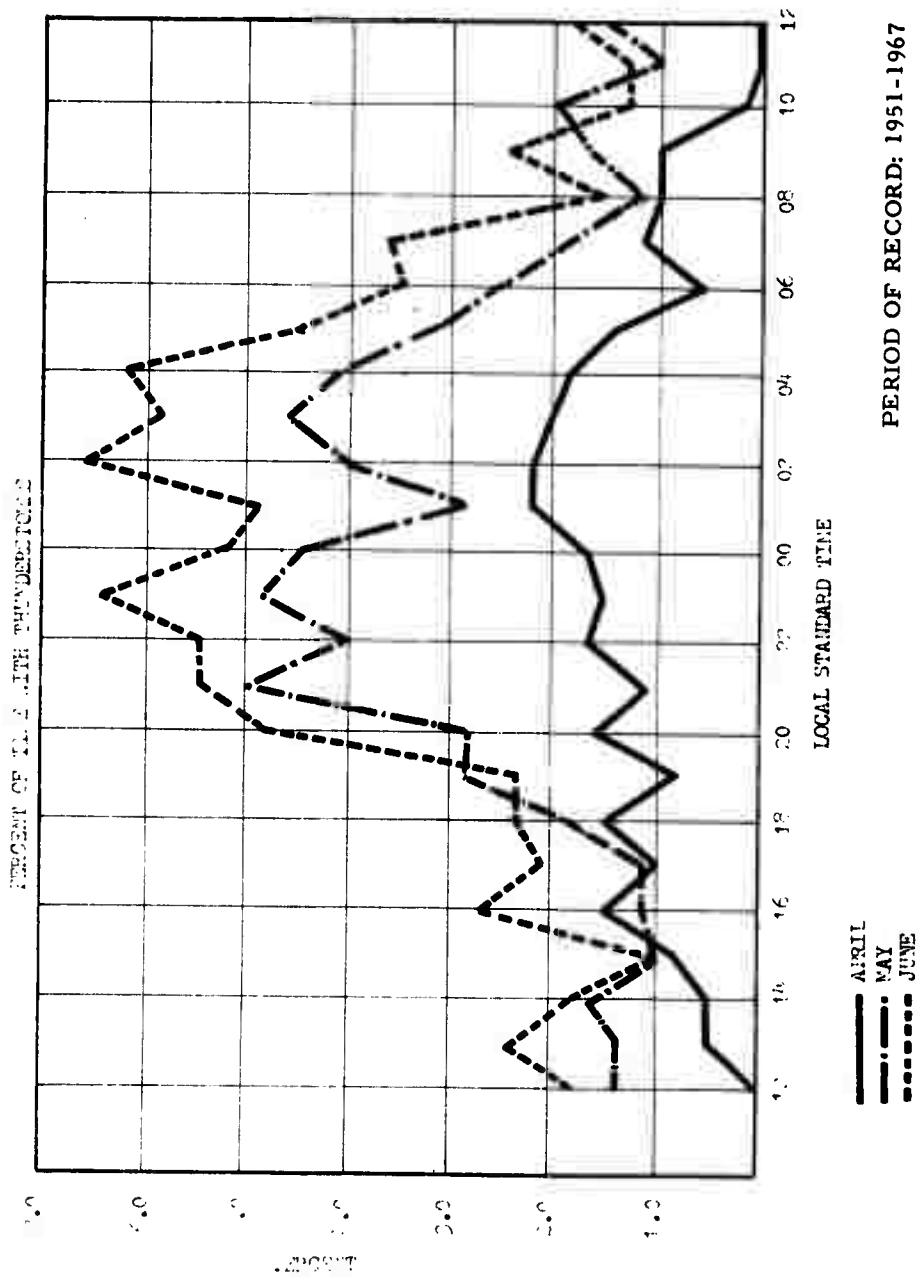
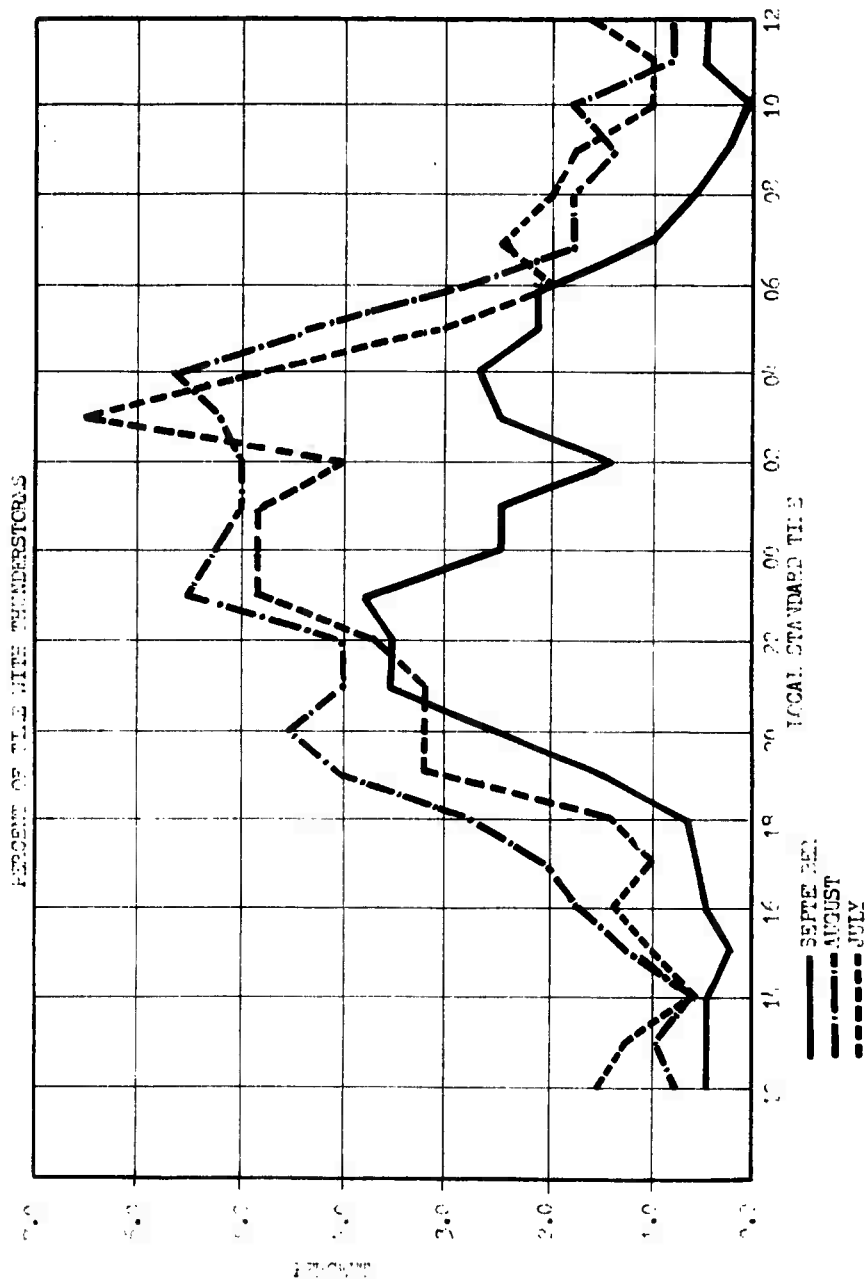


CHART 4 TSTM DISTRIBUTION
11-C-9



PERIOD OF RECORD: 1951-1967

CHART 5 TSTM DISTRIBUTION
11-C-10

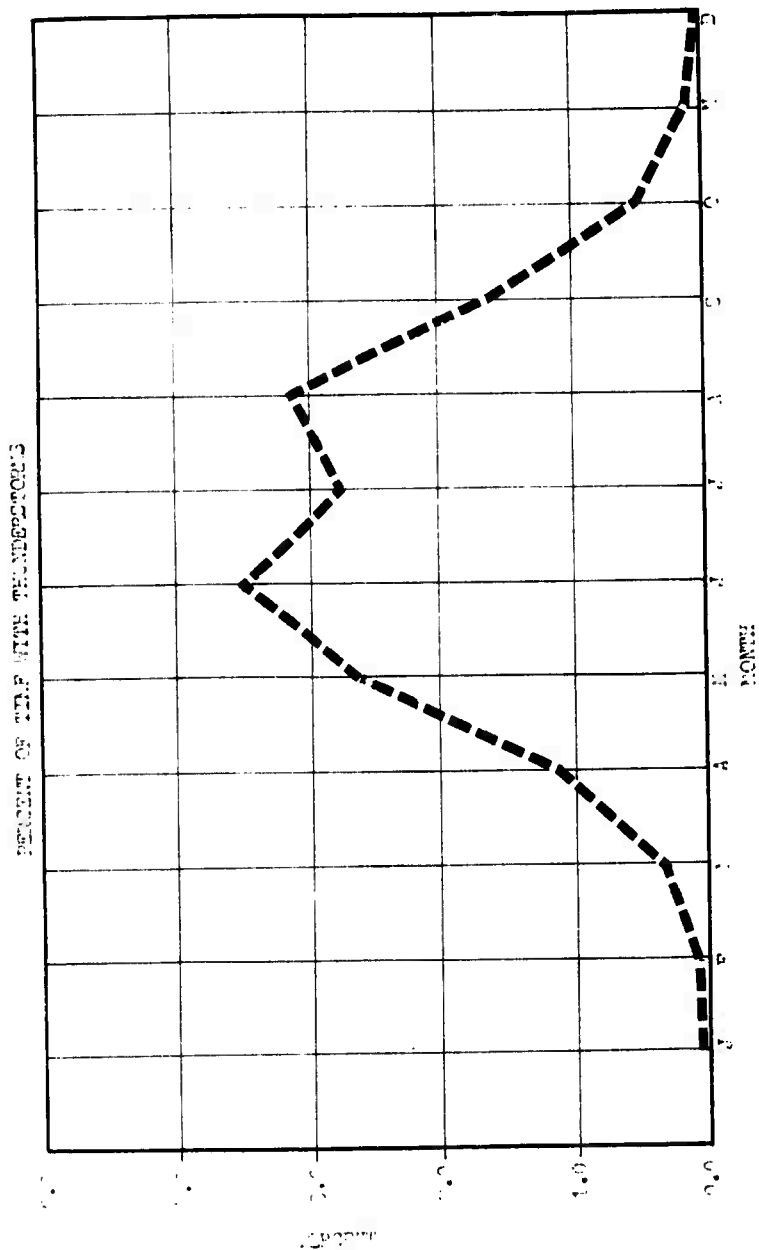


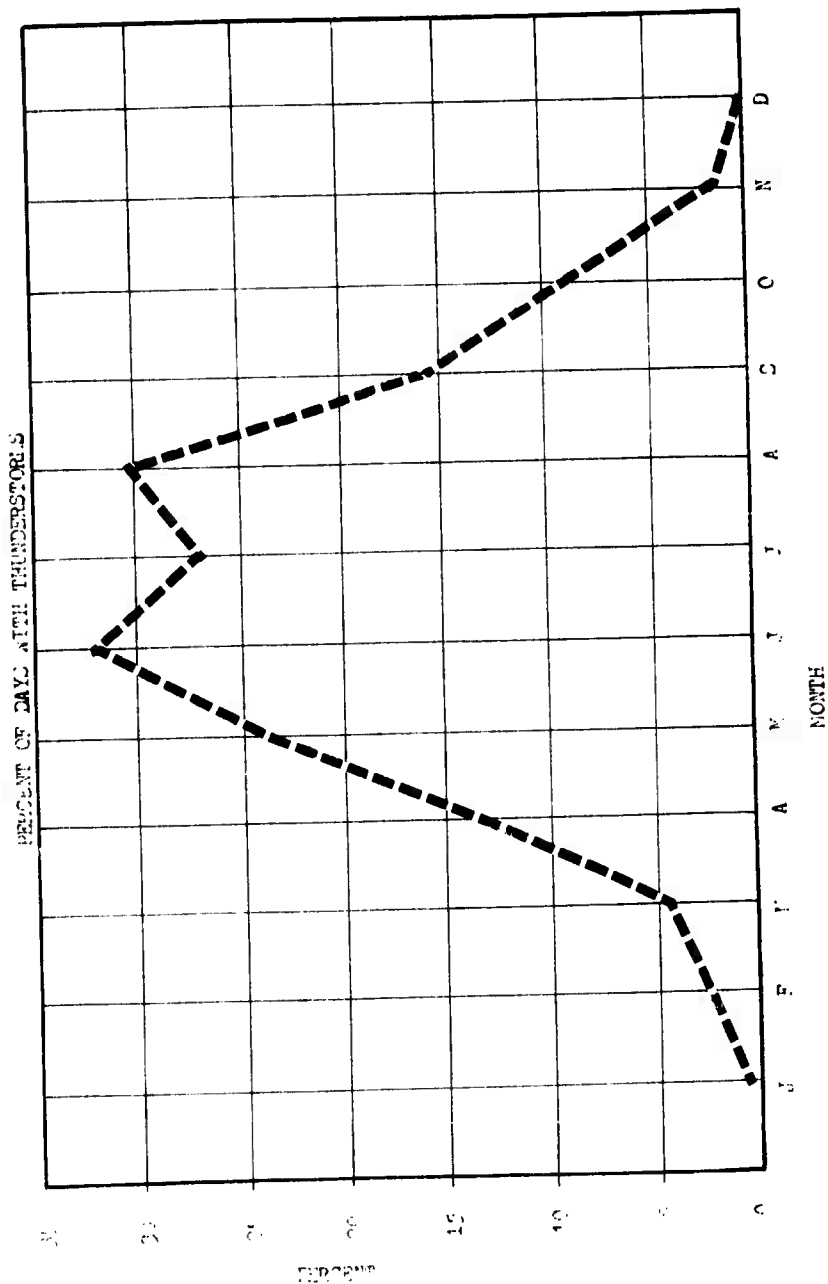
CHART 6 TSM DISTRIBUTION
11-C-11

PERIOD OF RECORD: 1951-1967

PERCENT OF DAYS WITH THUNDERSTORMS OCCURRING ON A SUMMARY OF THE DAY OBSERVATION BASED ON DAILY OBSERVATIONS FOR 17 YEARS FROM JAN 48 TO JUN 65.

THD	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.2	2.0	4.5	13.7	24.2	32.4	27.7	30.1	16.7	8.6	2.2	0.2
HAIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.0	0.6	0.9	2.6	3.4	2.6	0.9	0.4	0.2	0.5	0.4	0.0

TABLE 6 TSPM DAYS
II-C-12



PERIOD OF RECORD: JAN 1948 - JUN 1965

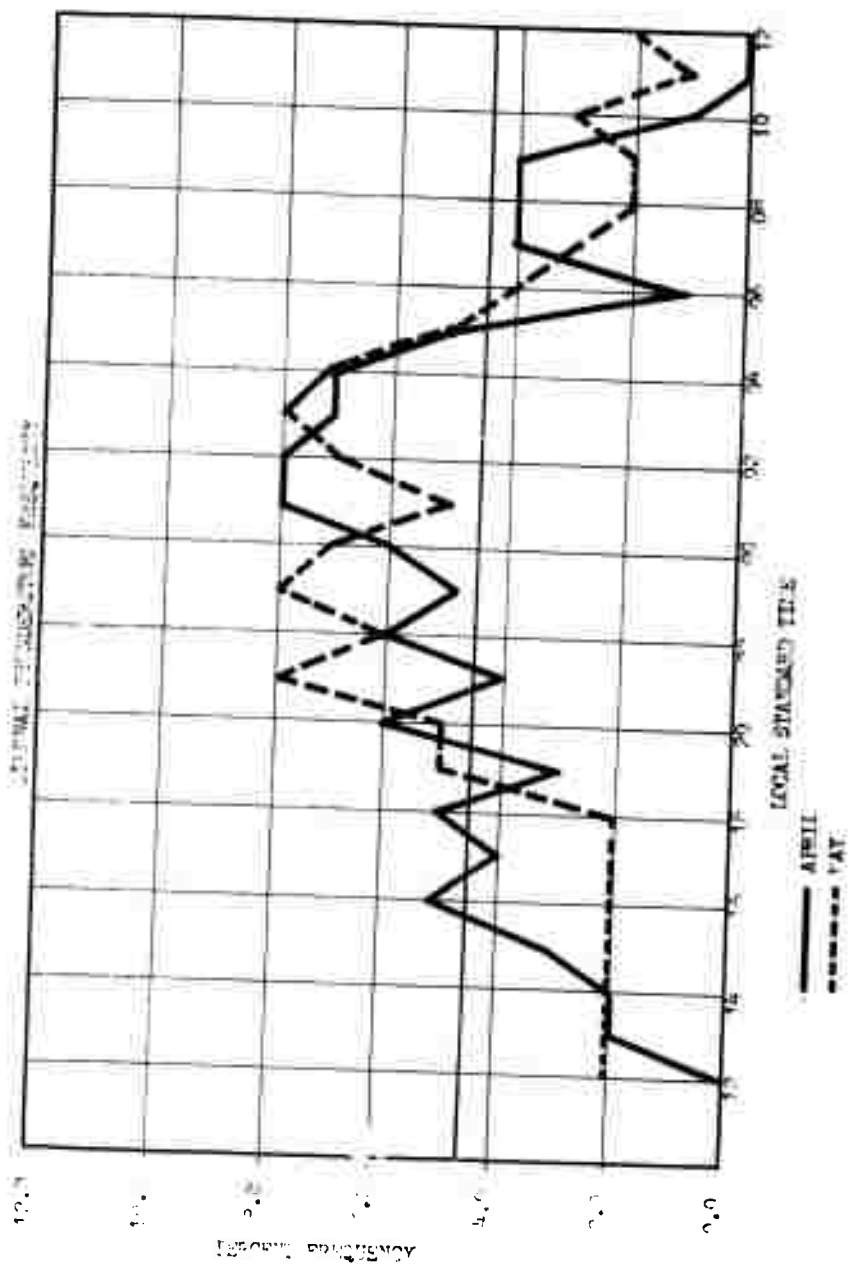
CHART 7 TSTM DAYS
11-C-13

PERCENT FREQUENCY OF OCCURRENCE OF THUNDERSTORMS BY HOUR AND MONTH

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
12	33	06	03	-	02	01	02	01	01	02	-	-
13	-	06	03	02	02	02	02	01	01	06	-	-
14	-	06	05	02	02	01	01	01	01	02	-	-
15	-	-	05	03	02	01	01	01	01	-	-	-
16	-	-	-	05	02	03	02	02	01	02	-	-
17	-	06	05	04	02	02	02	03	02	03	06	-
18	-	06	03	05	02	03	02	04	02	02	06	100
19	-	-	05	03	05	03	05	05	04	-	-	-
20	-	-	05	06	05	06	05	06	07	03	-	-
21	-	-	11	04	08	07	06	05	09	07	-	-
22	-	-	03	06	06	07	06	06	09	05	06	-
23	-	13	08	05	08	08	08	07	10	10	12	-
00	-	-	05	06	07	07	08	07	06	08	22	-
01	-	06	05	08	05	06	07	07	07	10	12	-
02	33	06	05	08	07	09	07	07	04	03	12	-
03	-	06	03	07	08	07	10	07	07	03	06	-
04	-	06	05	07	07	07	07	08	07	02	12	-
05	34	20	08	05	05	05	05	07	06	07	06	-
06	-	13	03	01	04	04	03	04	06	08	-	-
07	-	-	05	04	03	04	03	03	04	03	-	-
08	-	-	05	04	02	02	03	03	02	02	-	-
09	-	-	-	04	02	03	03	02	01	07	-	-
10	-	-	-	01	03	01	01	02	01	03	-	-
11	-	-	05	-	01	01	01	01	01	02	-	-

TABLE 7 DIURNAL FREQUENCY
II-C-14

PERIOD OF RECORD: 1951-1967



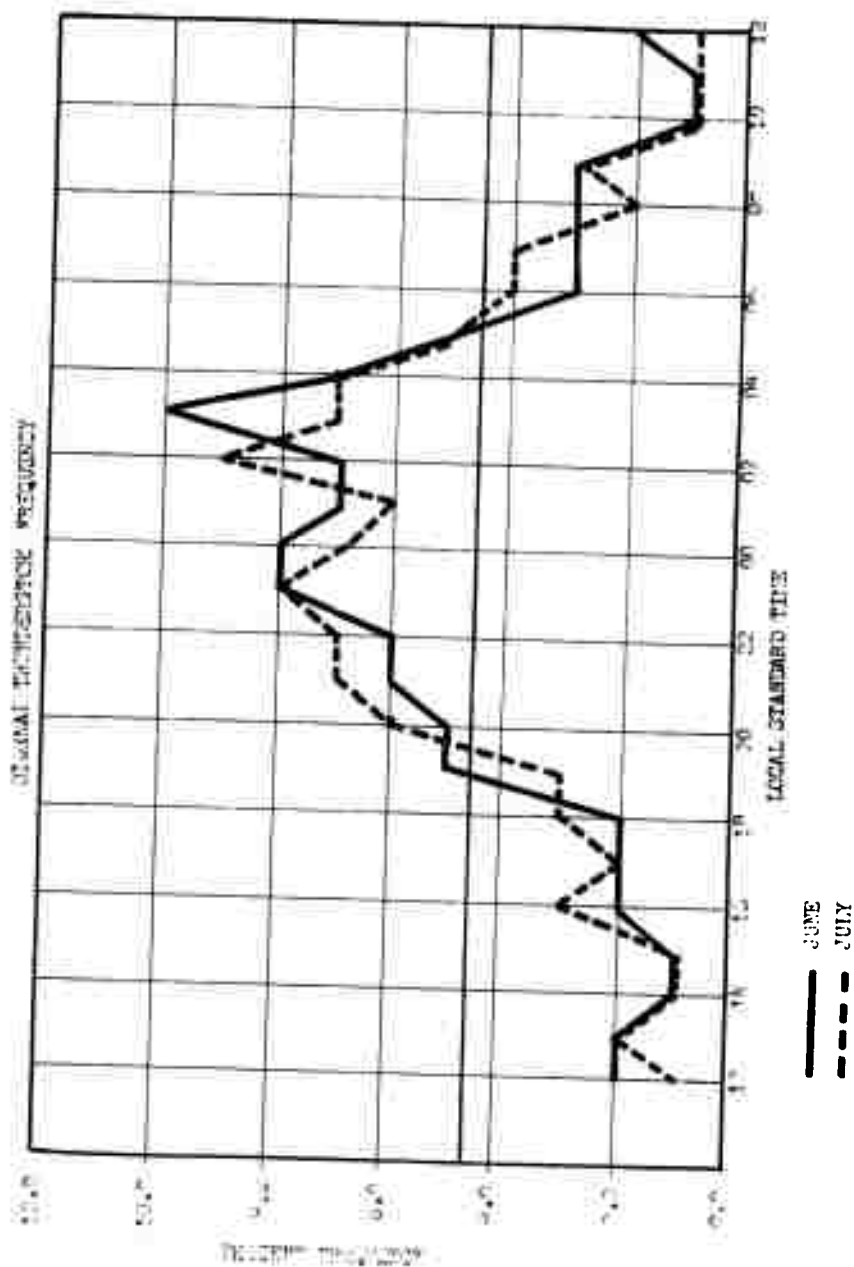
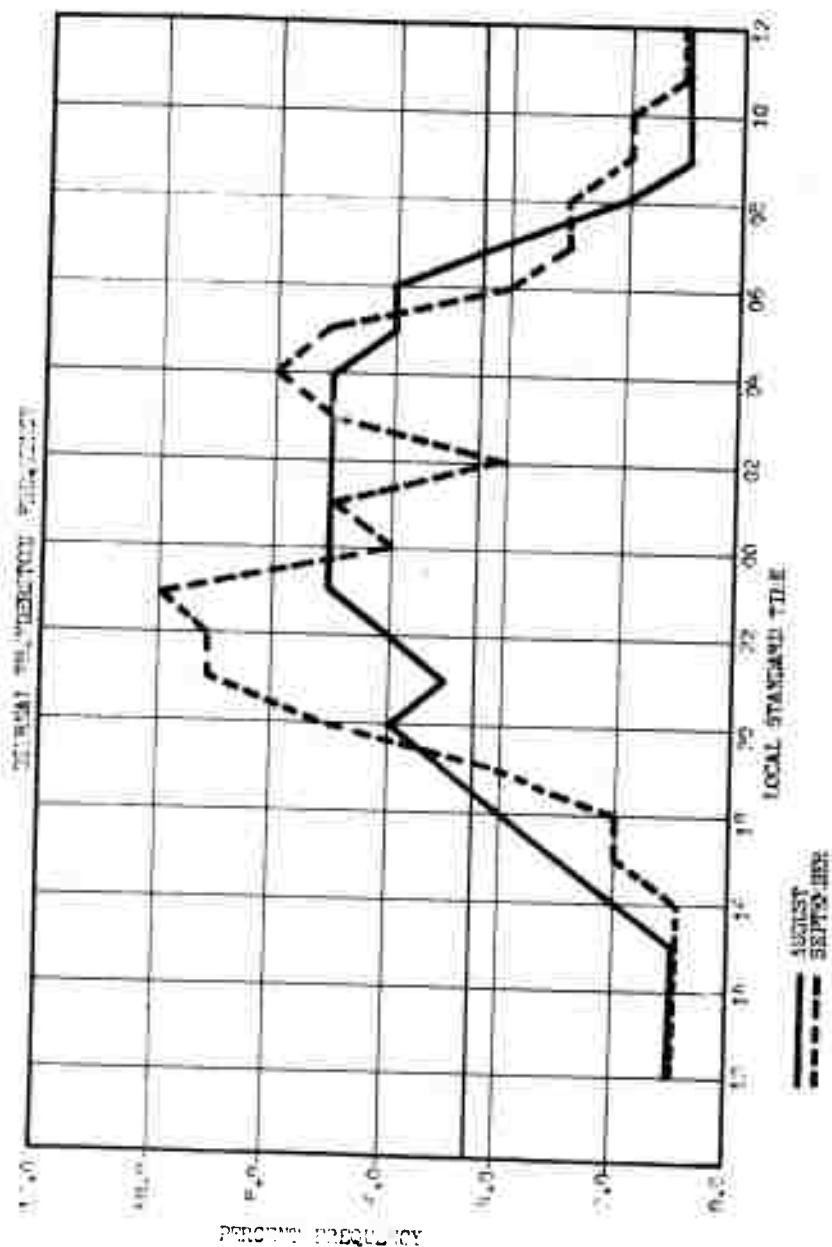


CHART 9 DIURNAL FREQ
11-C-16

PERIOD OF RECORD: 1951-1967



PERCENT FREQUENCY

CHART 10 DIURNAL FREQ
II-C-17

THUNDERSTORM RECORDS

A...MOST CONTINUOUS HOURLY OBSERVATIONS REPORTING T OR TRW ON ONE DAY

B...MOST T OR TRW OBSERVATIONS REPORTED IN ONE DAY ON RECORD OBS
(ALL TIMES LOCAL)

MONTH	A.		B.	
JANUARY	5 JAN 1955	02	24 JAN 1967	2Hrs
	24 JAN 1967	05		
	24 JAN 1967	12		
FEBRUARY	28 FEB 1951	03-05	28 FEB 1951	3Hrs
	19 FEB 1954	12-14	19 FEB 1954	3Hrs
MARCH	18 MAR 1963	11-14	18 MAR 1963	4Hrs
APRIL	8 APR 1965	01-09	28 APR 1963	9Hrs
			8 APR 1965	9Hrs
MAY	28 MAY 1962	08-21	28 MAY 1962	15Hrs
	22 MAY 1965	00-10	22 MAY 1965	14Hrs
JUNE	24 JUN 1963	04-13	9 JUN 1967	14Hrs
JULY	30 JUL 1958	00-08	26 JUL 1967	11Hrs
AUGUST	22 AUG 1954	16-00	22 AUG 1954	9Hrs
SEPTEMBER	2 SEP 1961	17-00	2 SEP 1961	8Hrs
OCTOBER	20 OCT 1954	00-05	20 OCT 1954	5Hrs
NOVEMBER	1 NOV 1964	00-01	11 NOV 1965	6Hrs
	15 NOV 1964	03-04		
	11 NOV 1965	04-05		
		17-18		
		23-00		
DECEMBER	26 DEC 1959	18	26 DEC 1959	1Hr

TABLE 8 TSTM RECORDS
II-C-18

PERIOD OF RECORD: 1951-1967

NEBRASKA

AVG NO OF TORNADOES 1916-1963

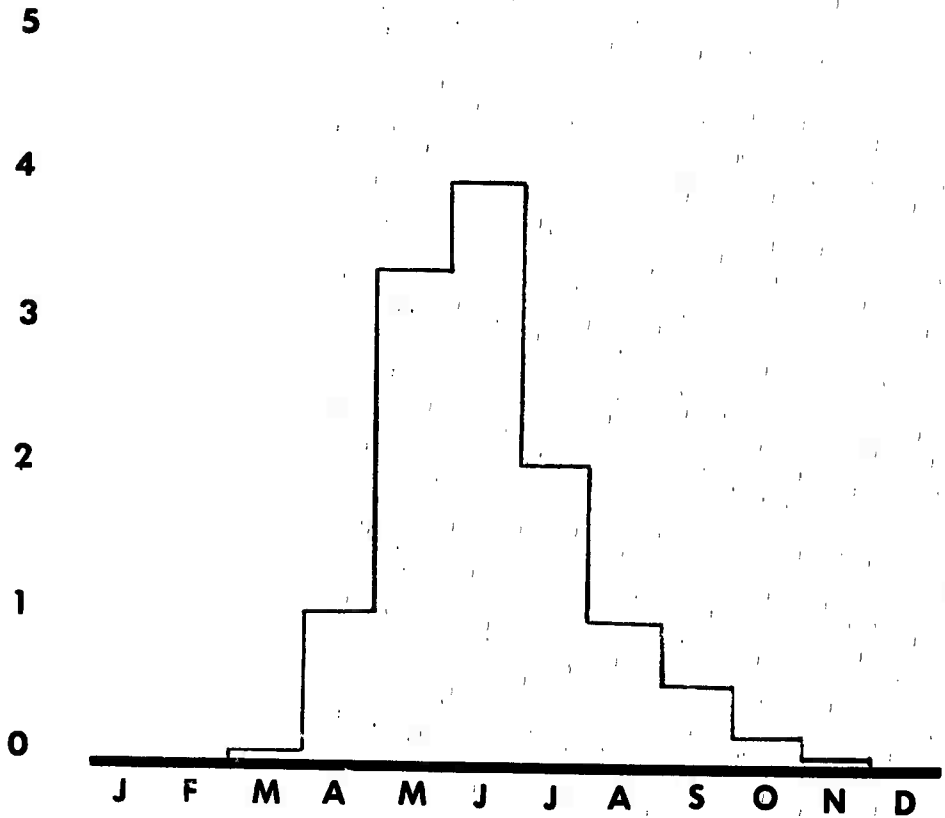


CHART 11 TORNADO FREQ
11-C-19

NEBRASKA

DIURNAL OCCURRENCE OF TORNADOES 1916-1958

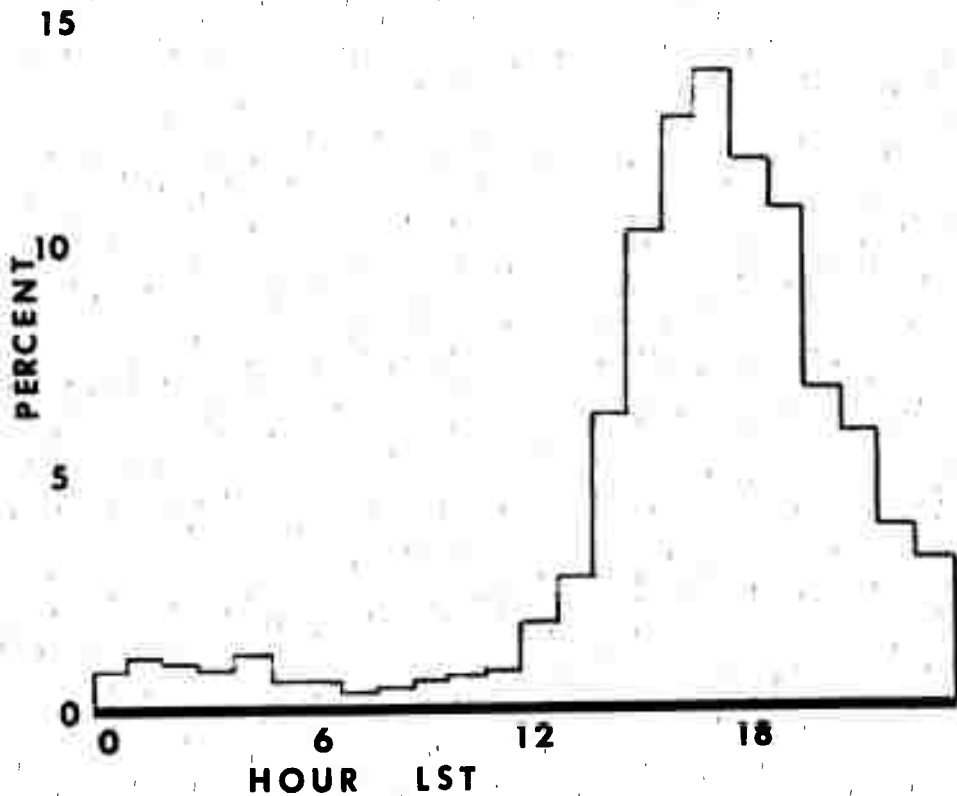


CHART 12 DIURNAL TORNADO
II-C-20

SECTION D WINDS

The following set of histograms depicts a frequency distribution of wind velocity and direction by month. Throughout the year two maxima exist: NW being dominant from October through April with SE dominant for the remainder of the year. The NW winds normally result from cold frontal passages and continue while the advancing surface high remains north. Wind velocities are highest in all categories during the winter and spring. SE winds occur in the flow to the rear of eastward moving highs and in developing lows or the lee-side trough of the Rockies. June shows the highest frequency of occurrence of winds from S-SE and also the highest frequency of occurrence of winds above 10 knots from these directions.

PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

JANUARY

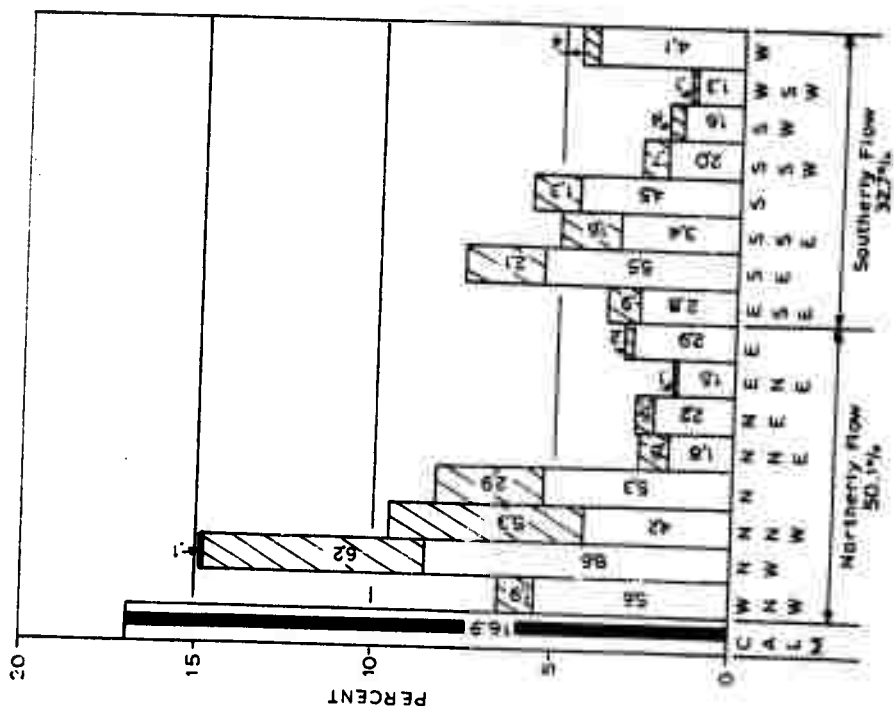
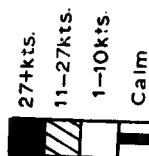
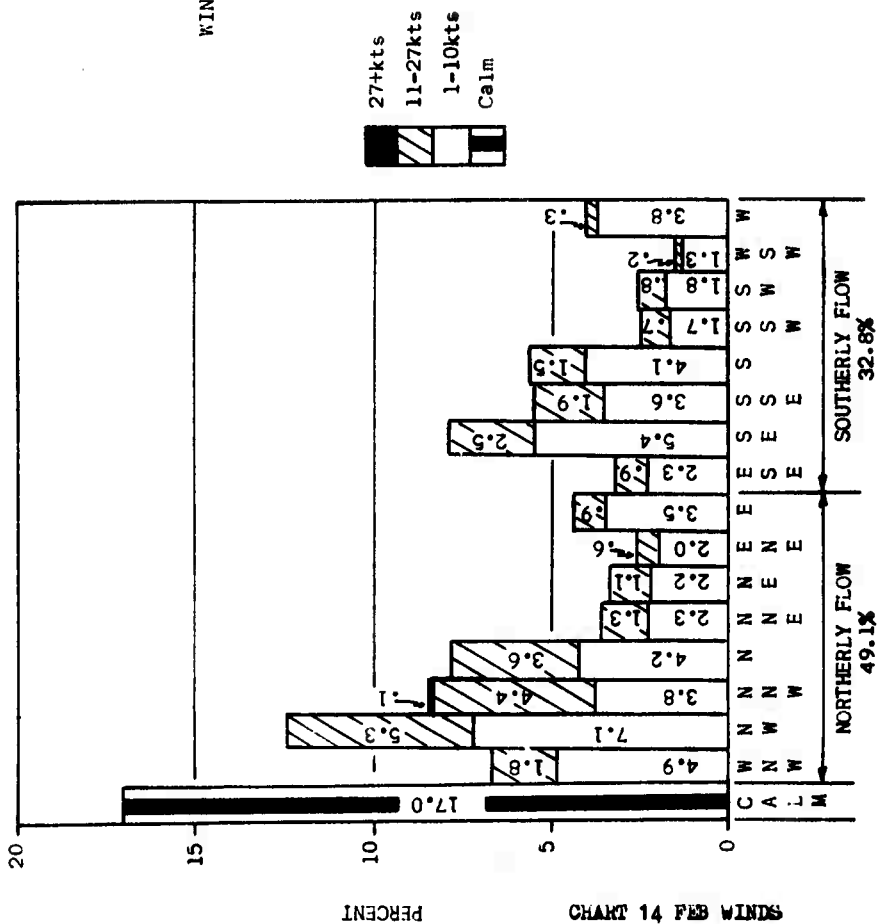


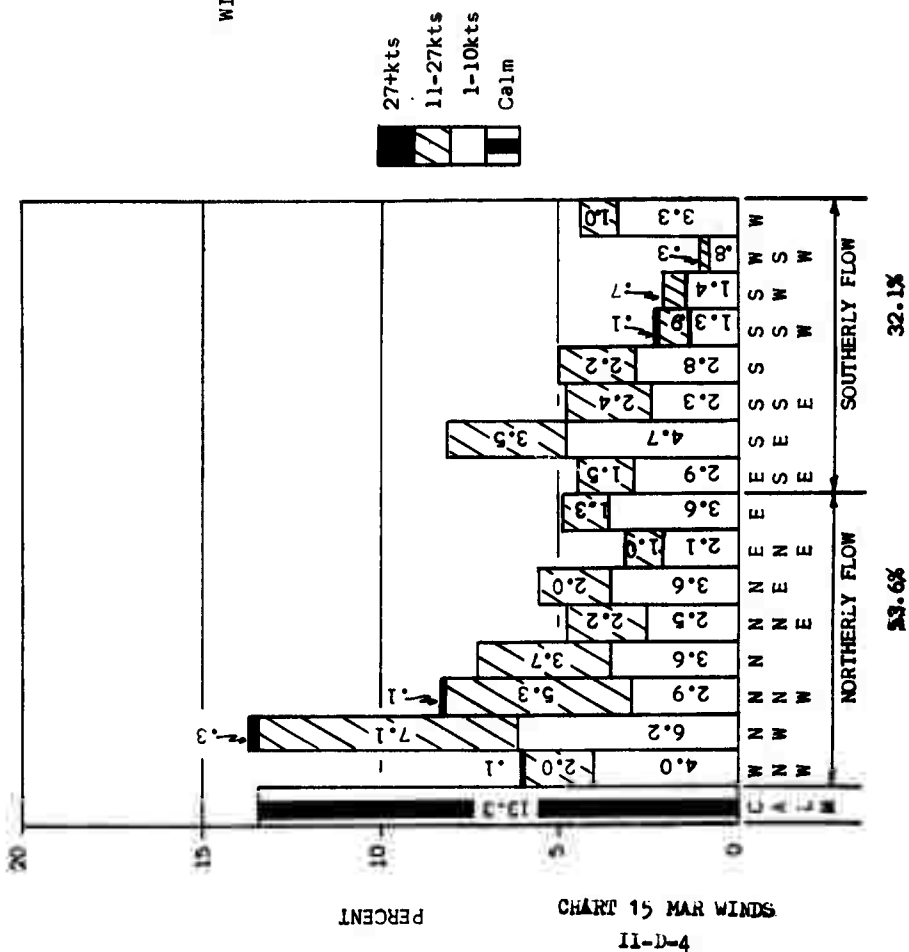
CHART 13 JAN WINDS
II-D-2

PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

FEBRUARY

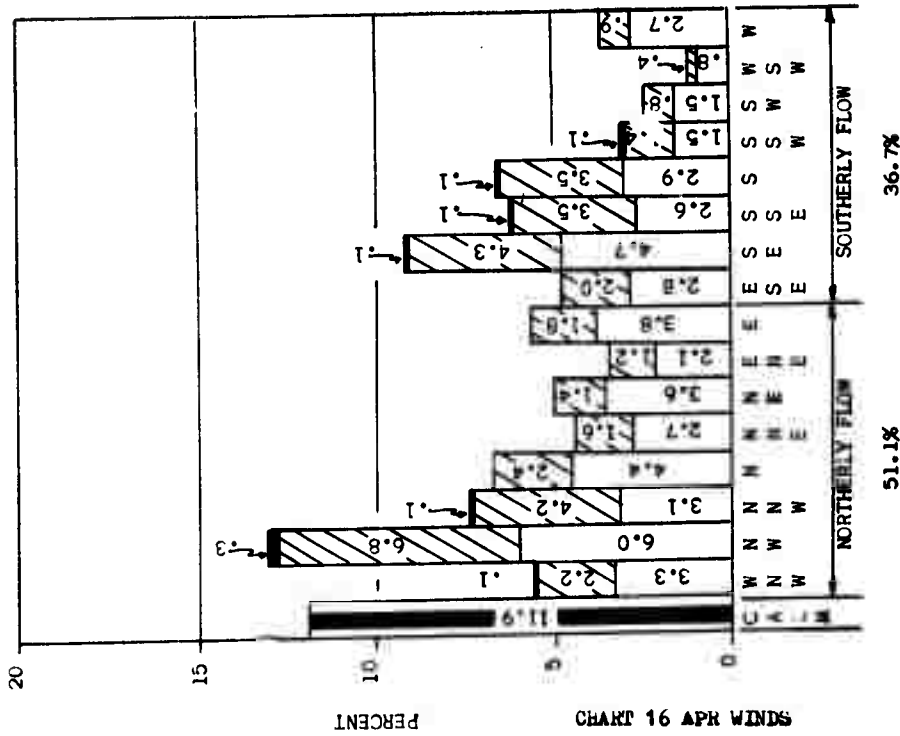


MARCH



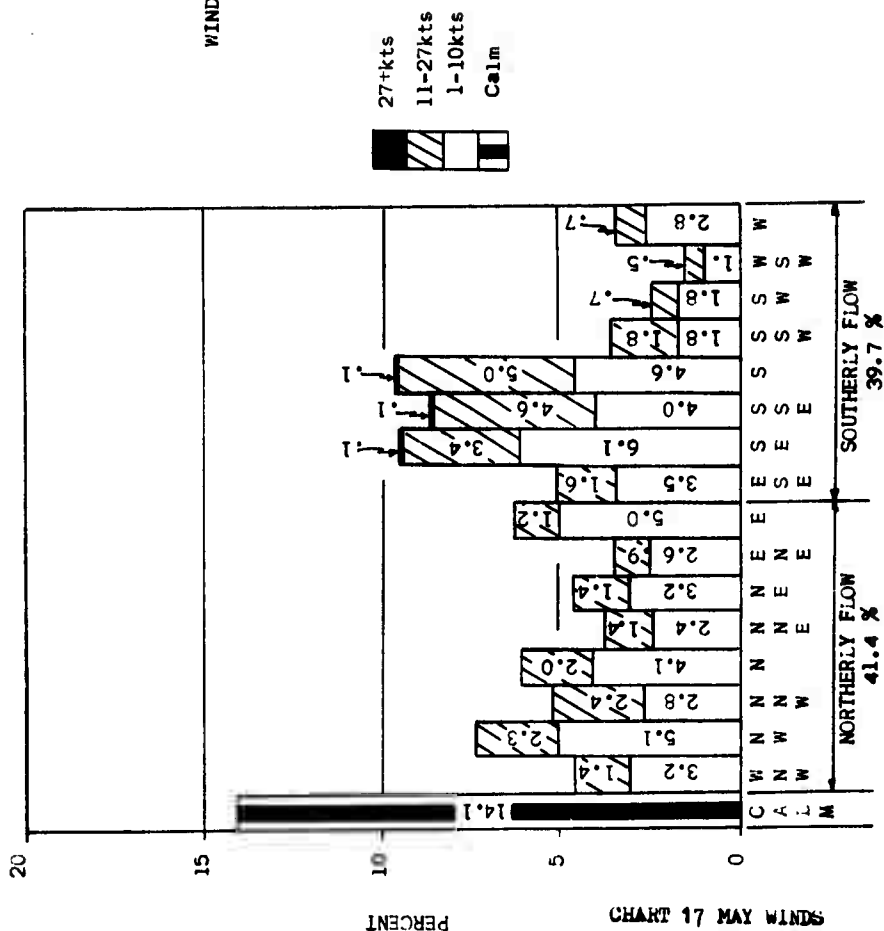
PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

APRIL



PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

MAY



PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

JUNE

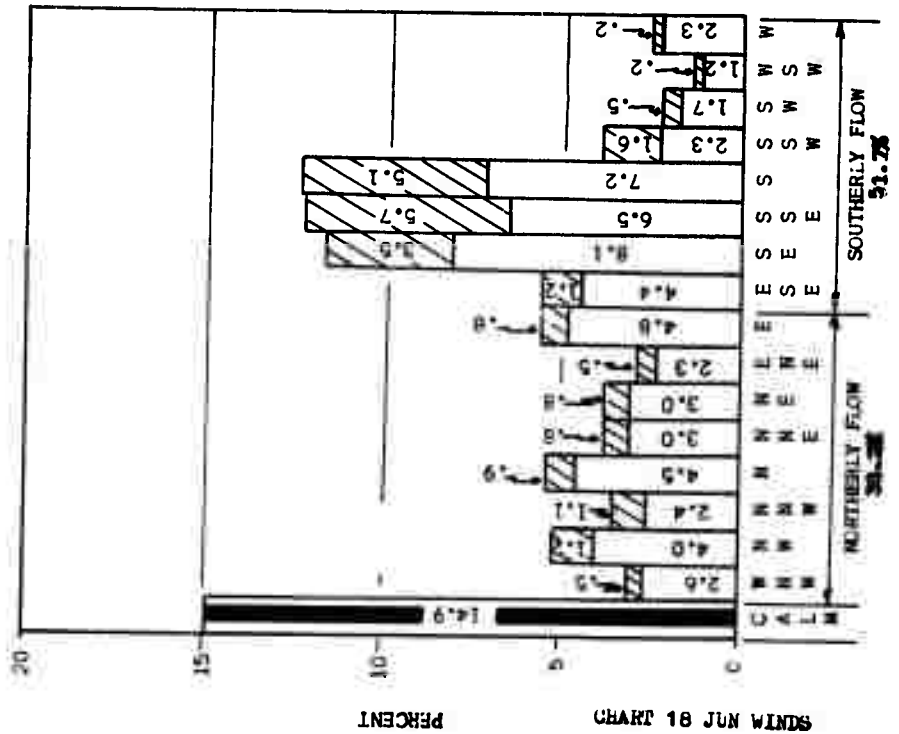
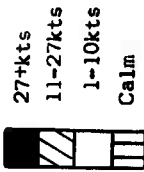
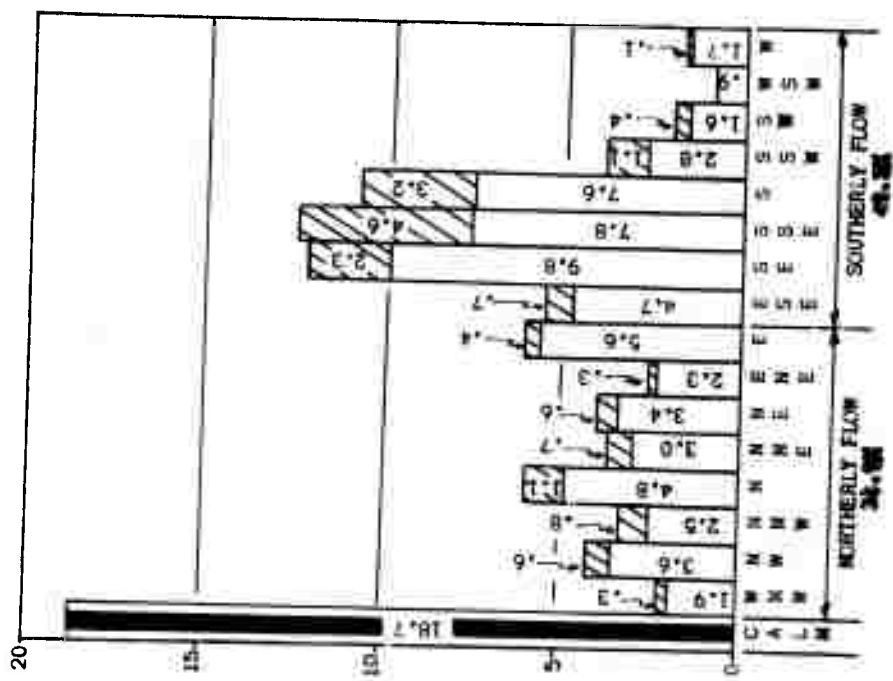
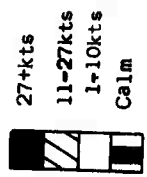


CHART 18 JUN WINDS

11-D-7

PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

JULY



PERCENT

CHART 19 JUL WINDS

II-D-8

PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)
AUGUST

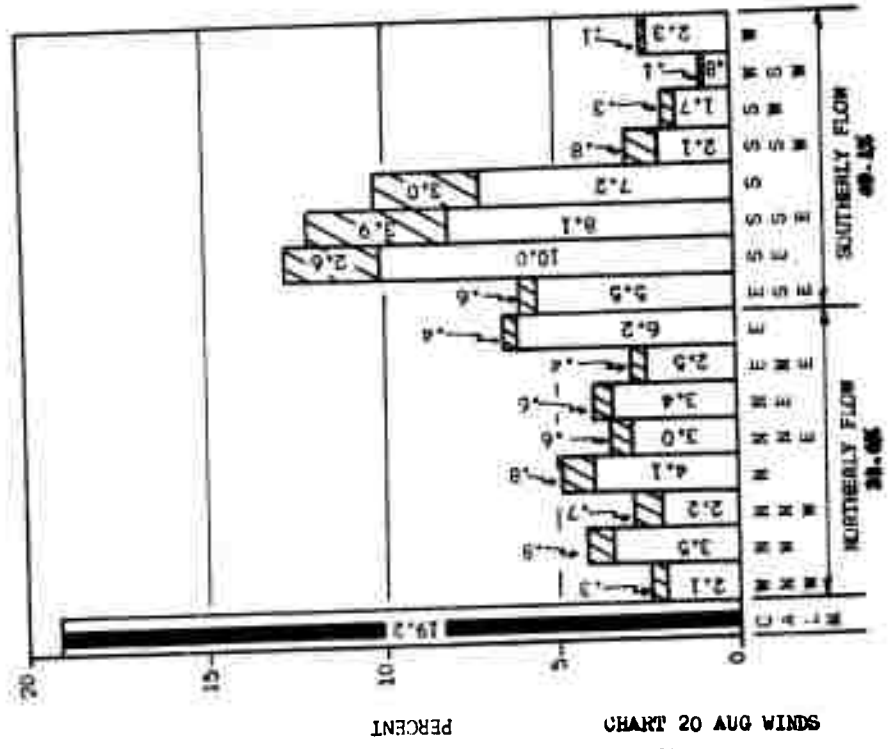
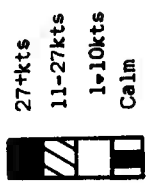
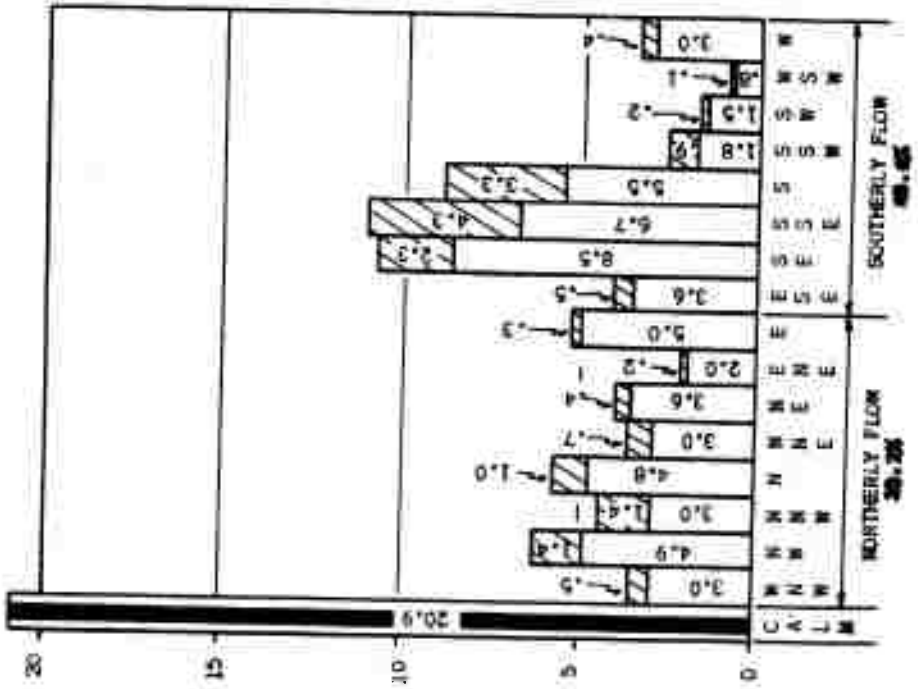


CHART 20 AUG WINDS
6-11-67

PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

SEPTEMBER

27+ kts
11-27 kts
1-10 kts
Calm



PERCENT

CHART 21 SEP WINDS
II-D-10

PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

OCTOBER

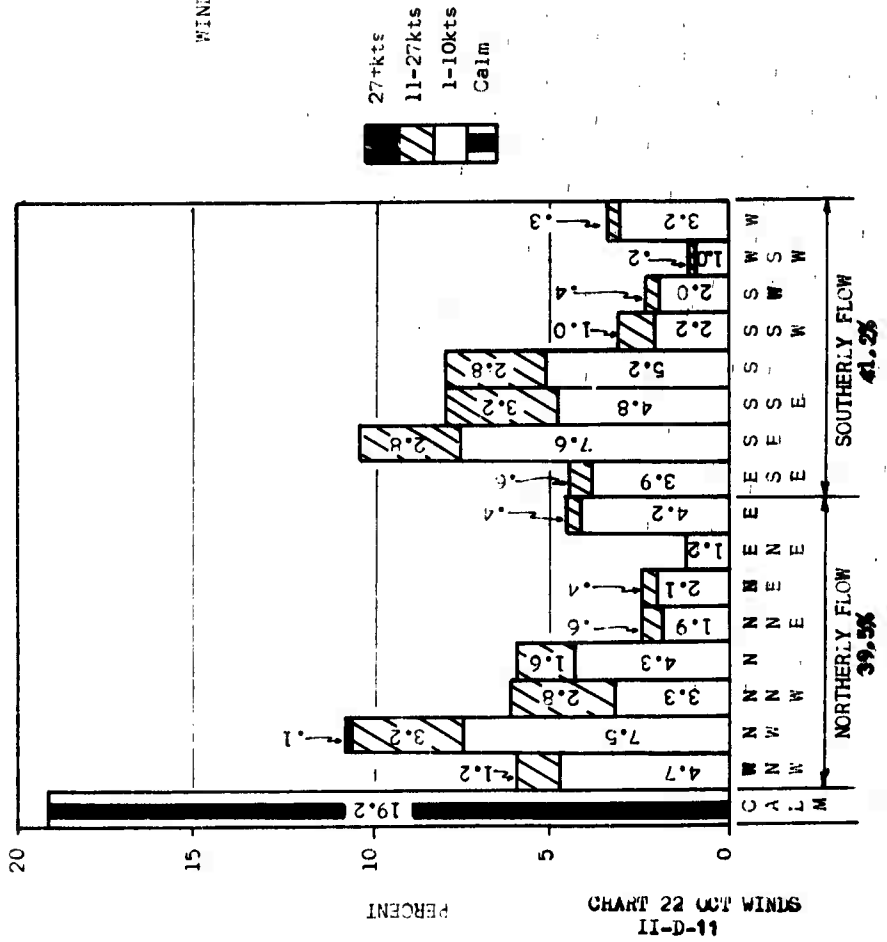


CHART NO 22 WINDS
11-D-11

PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 42-Sept 67)

NOVEMBER

27+ kts
11-27 kts
1-10 kts
Calm

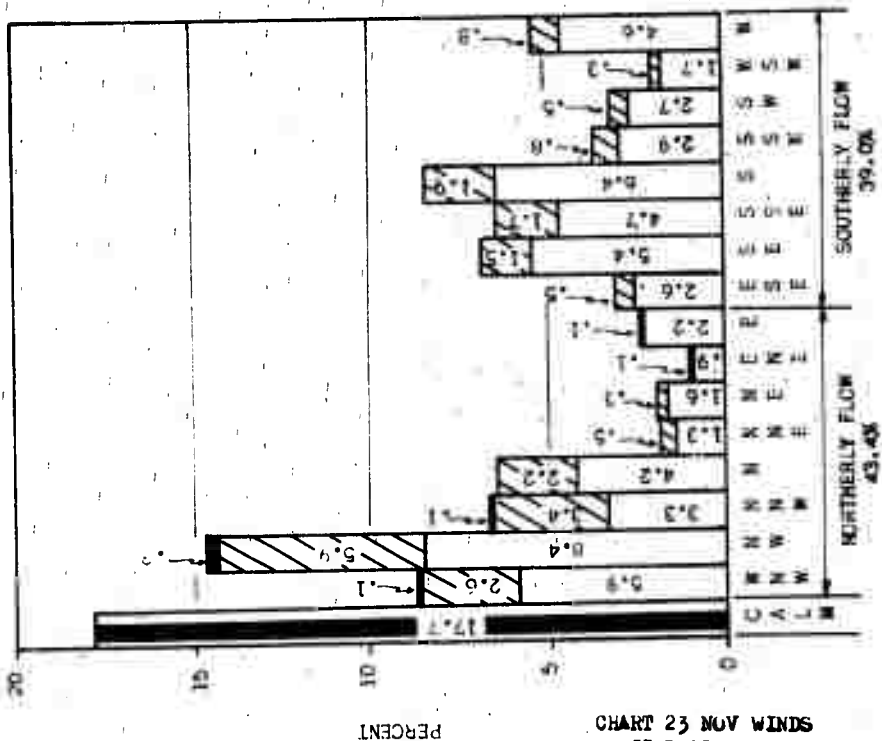


CHART 23 NOV WINDS
11-D-12

PERCENT OCCURRENCE
of
WIND-VELOCITY & DIRECTION
(Jan 48-Sept 67)

DECEMBER

27+ kts
11-27 kts
1-10 kts
Calm

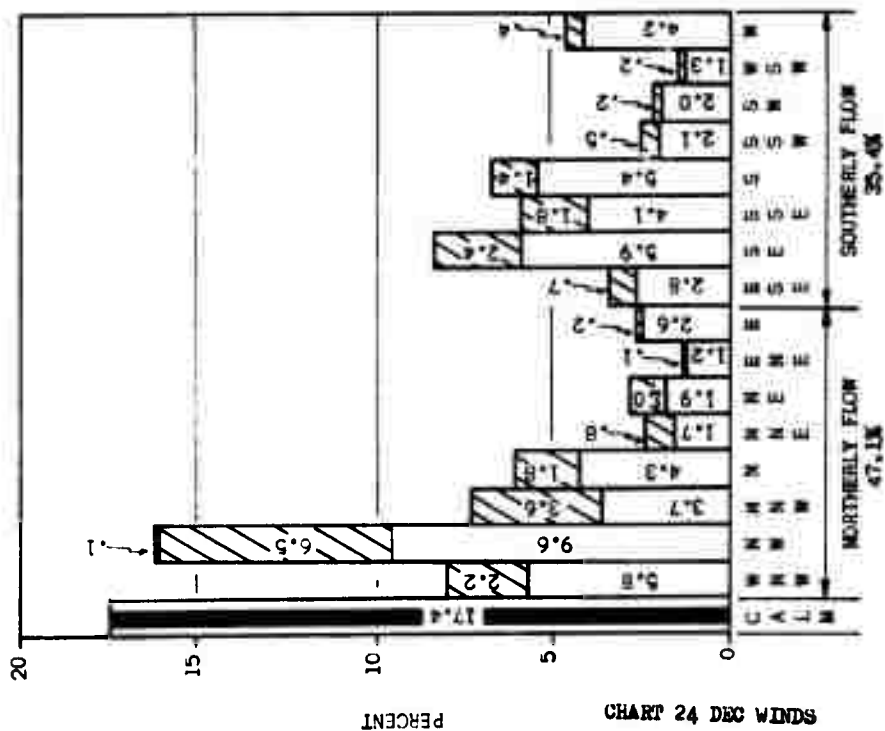
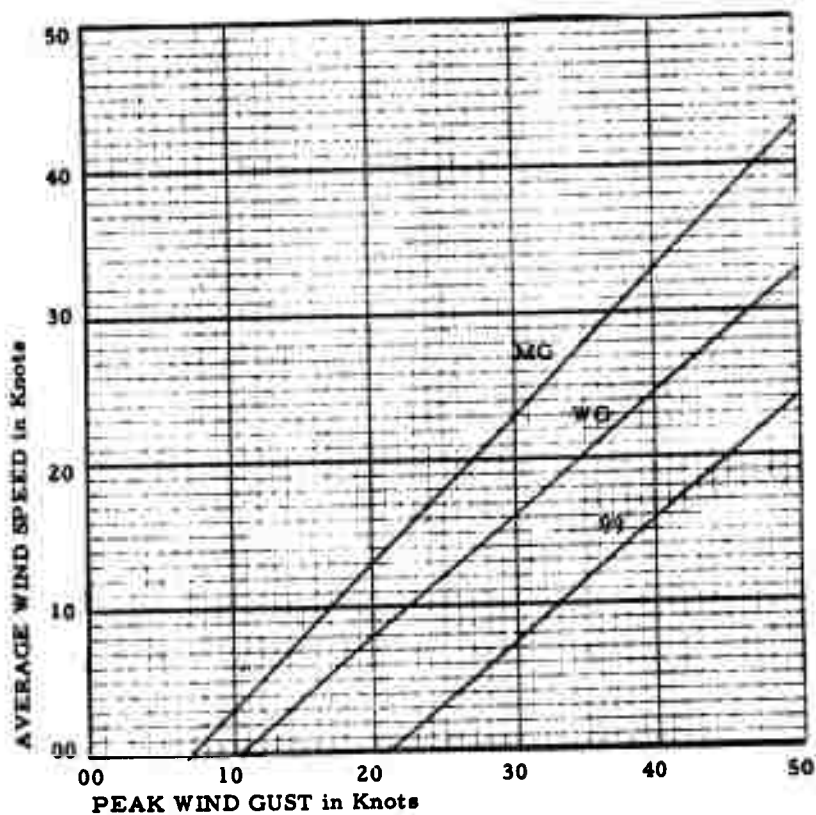


CHART 24 DEC WINDS
II-D-13

OFFUTT AFB, NE



Nomogram relating average wind speed to peak wind gust in knots.

WG = Weighted mean gust, MG = Minimum gust, 99 = 99% of peak wind gusts will be less than that indicated by the regression line.

$$WG = 1.2 (\text{Mean Wind Speed}) + 10.5$$

$$MG = (\text{Mean Wind Speed}) + 7$$

$$99\% \text{ of gusts will be less than: } 1.2 (\text{Mean Wind Speed}) + 21$$

Period of Record: 1 January 1952 through 30 April 1967

SECTION E FLYING WEATHER

The accompanying chart depicts the overall flying weather observed at Offutt AFB. The ordinate is in percent frequency of occurrence and the abscissa is 3 hourly time blocks by month. The area enclosed by the upper line is the percent of time the hourly observation is less than 1500 feet and/or 3 miles while the lower line represents 200 feet and/or $\frac{1}{2}$ mile. For a more detailed summary refer to Part D of the Revised Uniform Summary of Surface Weather Observations for Offutt AFB.

ANNUAL FLYING WEATHER

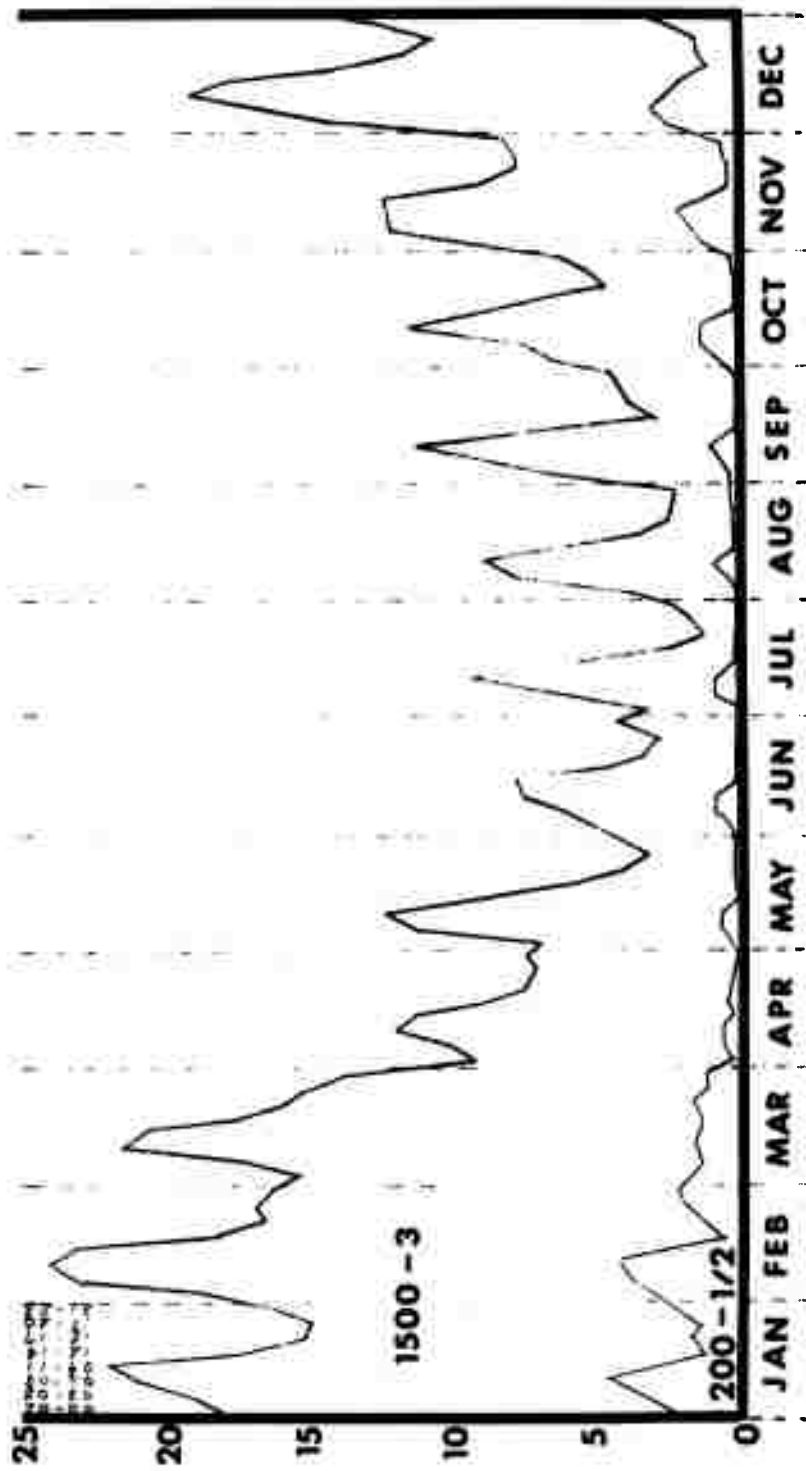


CHART 25 FLYING WE
LINE 2

SECTION F EQUIVALENT CHILL

During the winter season the combined effects of wind speed and free air temperature result in an effective sensible temperature which is considerably lower than that recorded on the Offutt observations. Certain protective measures are taken by base agencies when the Equivalent Chill Temperature exceeds certain critical values. Three charts are provided to acquaint the newly assigned forecaster with those periods when base agencies will be interested in Equivalent Chill Temperature and they are: (1) Chart used to obtain the numerical value for Equivalent Chill Temperature; (2) the monthly average occurrence for below -20°F and -40°F ; and (3) the diurnal variation for these two selected values during the worst month of January.

WIND SPEED		COOLING POWER OF WIND EXPRESSED AS "EQUIVALENT CHILL TEMPERATURE"																				
KNOTS	MPH	TEMPERATURE (°F)																				
		40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	-55	-60
CALM		CALM																				
		EQUIVALENT CHILL TEMPERATURE																				
3 - 6	5	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	-55	-65	-70
7 - 10	10	30	20	15	10	5	0	-10	-15	-20	-25	-35	-40	-45	-50	-60	-65	-70	-75	-80	-90	-95
11 - 15	15	25	15	10	0	-5	-10	-20	-25	-30	-40	-45	-50	-60	-65	-70	-80	-85	-90	-100	-105	-110
16 - 19	20	20	10	5	0	-10	-15	-25	-30	-35	-45	-50	-60	-65	-75	-80	-85	-95	-100	-110	-115	-120
20 - 23	25	15	10	0	-5	-15	-20	-30	-35	-45	-50	-60	-65	-75	-80	-90	-95	-105	-110	-120	-125	-135
24 - 28	30	10	5	0	-10	-20	-25	-30	-40	-50	-55	-65	-70	-80	-85	-95	-100	-110	-115	-125	-130	-140
29 - 32	35	10	5	-5	-10	-20	-30	-35	-40	-50	-60	-65	-75	-80	-90	-100	-105	-115	-120	-130	-135	-145
33 - 36	40	10	0	-5	-15	-20	-30	-35	-45	-55	-60	-70	-75	-85	-95	-100	-110	-115	-125	-130	-140	-150
WINDS ABOVE 40 HAVE LITTLE ADDITIONAL EFFECT.		LITTLE DANGER					INCREASING DANGER (Flesh may freeze within 1 min.)					GREAT DANGER (Flesh may freeze within 30 seconds)										
DANGER OF FREEZING EXPOSED FLESH FOR PROPERLY CLOTHED PERSONS																						

INSTRUCTIONS

MEASURE LOCAL TEMPERATURE AND WIND SPEED IF POSSIBLE; IF NOT, ESTIMATE. ENTER TABLE AT CLOSEST 5° F INTERVAL ALONG THE TOP AND WITH APPROPRIATE WIND SPEED ALONG LEFT SIDE. INTERSECTION GIVES APPROXIMATE EQUIVALENT CHILL TEMPERATURE; THAT IS, THE TEMPERATURE THAT WOULD CAUSE THE SAME RATE OF COOLING UNDER CALM CONDITIONS.

NOTES

WIND

1. THIS TABLE WAS CONSTRUCTED USING MILES PER HOUR (MPH). HOWEVER, A SCALE GIVING THE EQUIVALENT RANGE IN KNOTS HAS BEEN INCLUDED ON THE CHART TO FACILITATE ITS USE WITH EITHER UNIT.
2. WIND MAY BE CALM BUT FREEZING DANGER GREAT IF PERSON IS EXPOSED IN MOVING VEHICLE, UNDER HELICOPTER ROTORS, IN PROPELLOR BLAST, ETC. IT IS THE RATE OF RELATIVE AIR MOVEMENT THAT COUNTS AND THE COOLING EFFECT IS THE SAME WHETHER YOU ARE MOVING THROUGH THE AIR OR IT IS BLOWING PAST YOU.
3. EFFECT OF WIND WILL BE LESS IF PERSON HAS EVEN SLIGHT PROTECTION FOR EXPOSED PARTS - LIGHT GLOVES ON HANDS, PARKA HOOD SHIELDING FACE, ETC.

ACTIVITY

DANGER IS LESS IF SUBJECT IS ACTIVE. A MAN PRODUCES ABOUT 100 WATTS (341 BTU·h) OF HEAT STANDING STILL BUT UP TO 1000 WATTS (3413 BTU·h) IN VIGOROUS ACTIVITY LIKE CROSS-COUNTRY SKIING.

PROPER USE OF CLOTHING and ADEQUATE DIET are both important.

COMMON SENSE

THERE IS NO SUBSTITUTE FOR IT. THE TABLE SERVES ONLY AS A GUIDE TO THE COOLING EFFECT OF THE WIND ON BARE FLESH WHEN THE PERSON IS FIRST EXPOSED. GENERAL BODY COOLING AND MANY OTHER FACTORS AFFECT THE RISK OF FREEZING INJURY.

This chart is adapted from AFP 161-1-11

AW5 MAY 68

TABLE 9 EQUIVALENT CHILL
II-F-2

ATCH 1 to AWSR 105-9

MAC-B APB, 111 00-0000

**EQUIVALENT CHILL TEMPERATURE
AVERAGE NUMBER OF OBS
LESS THAN -20 F AND -40 F**

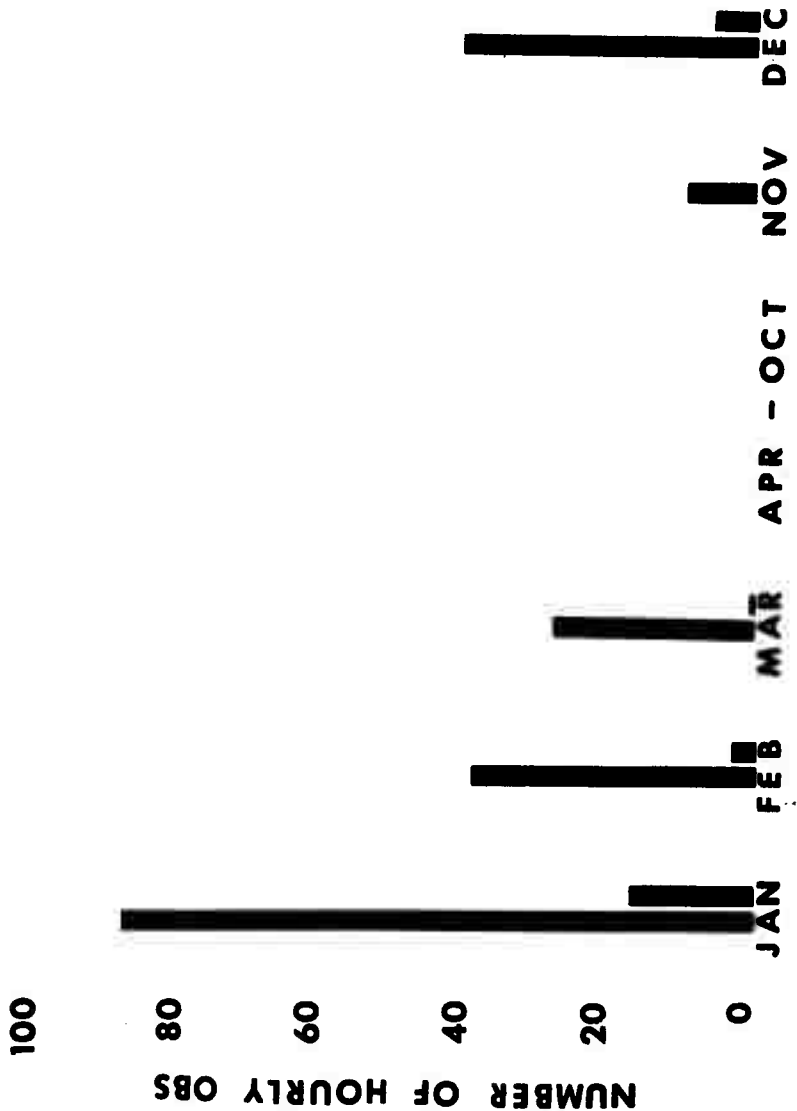


CHART 26 EQUIVALENT CHILL

II-F-3

JAN EQUIVALENT CHILL TEMP

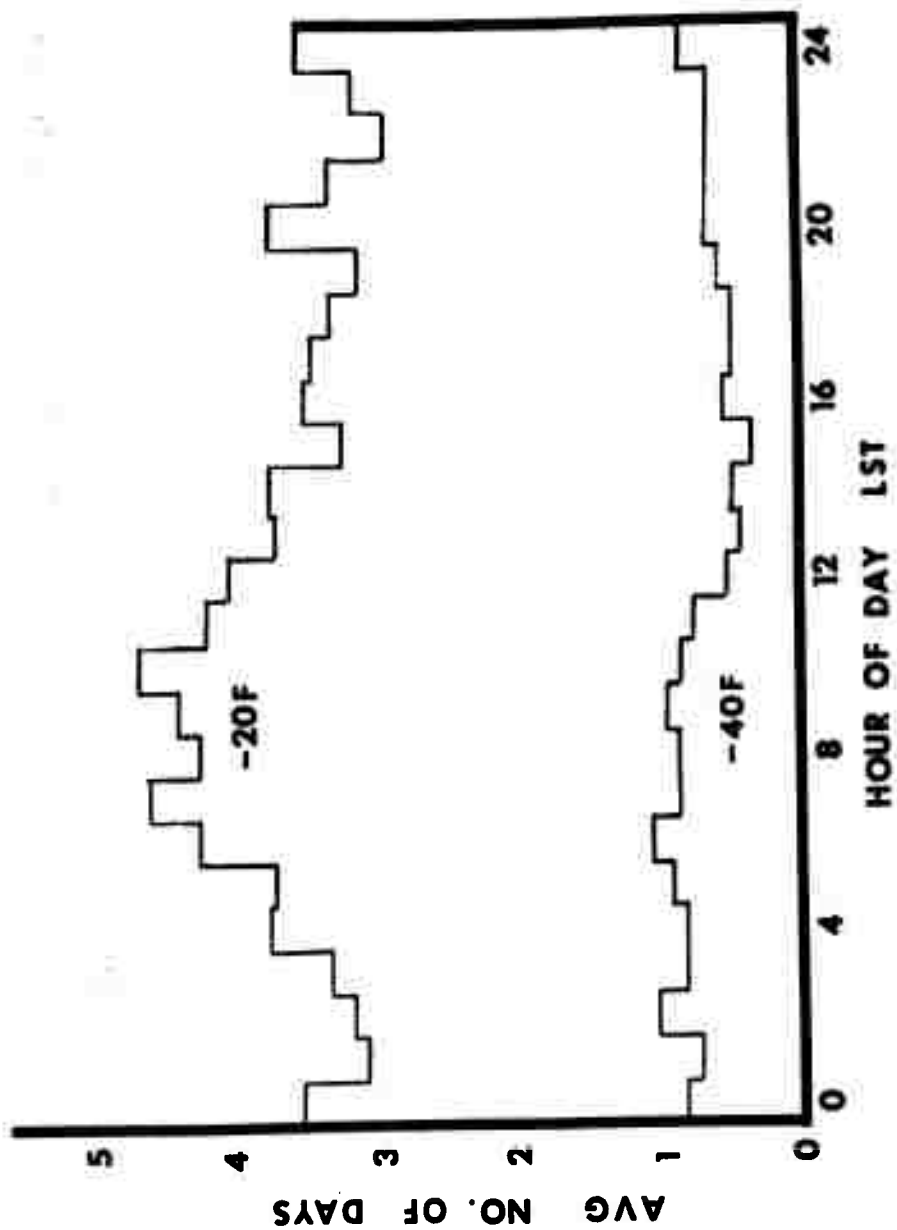


CHART 27 JAN EQUIV CHILL
II-F-4

MEAN STATION PRESSURE AND DEPARTURE FROM MEAN TABLES AND GRAPHS

The tables and graphs for mean station pressure and departure from the mean for Offutt AFB, NE, were compiled from hourly data from 1 January 1951 through 31 December 1958 and from three hourly data from 1 January 1959 through 30 April 1967.

To make all hours compatible, an average value was determined for each hour for the first period of data; then an average was determined for each three hourly for the entire period. An average of the difference between these two figures for three hourly data was used for linear interpolation of the intermediate hourly values between the three hourly data.

Due to a different period of record than that used in the RUSSWO, the mean monthly pressure values in these tables in general are less. The largest difference is 0.02 in. Hg. for the month of February.

The mean station pressure curve, the previous 24-hour pressure curve and prognostic chart pressure values may be used to forecast pressure and altimeter values for the station.

MSGT HEARN 0100 3VC FXT 7441 UNCLASSIFIED

OFFUTT AFB NB.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR JAN

00L	M 28.966 D -.004	06L	M 28.959 D -.003	12L	M 28.967 D .005	18L	M 28.955 D -.007
01L	M 28.951 D -.001	07L	M 28.963 D .001	13L	M 28.947 D -.015	19L	M 28.963 D .001
02L	M 28.962 D .000	08L	M 28.971 D .008	14L	M 28.937 D -.025	20L	M 28.957 D .005
03L	M 28.960 D -.002	09L	M 28.980 D .018	15L	M 28.940 D -.022	21L	M 28.970 D .008
04L	M 28.958 D -.005	10L	M 28.980 D .028	16L	M 28.943 D -.019	22L	M 28.972 D .010
05L	M 28.955 D -.008	11L	M 28.987 D .025	17L	M 28.947 D -.015	23L	M 28.972 D .010

MONTHLY MEAN 28.962

PERIOD OF REPORT 1/ 1/51 - 30/ 4/57
NUMBER OF OBSERVATIONS USED 7910
DATE PREPARED 26 JANUARY 1971

MSGT HFARN BLNG 500 7VC FXT 1441 UNCLASSIFIED

DATE 012671

DEPARTURE OF STATION PRESSURE FROM MEAN BY HOUR

FOR JAN

OFFUTT AFB NB.

LOCAL STANDARD TIME

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.

+0.09 INS.

+0.08 INS.

+0.07 INS.

+0.06 INS.

+0.05 INS.

+0.04 INS.

+0.03 INS.

+0.02 INS.

+0.01 INS.

24.96 00 INS.

-0.01 INS.

-0.02 INS.

-0.03 INS.

-0.04 INS.

-0.05 INS.

-0.06 INS.

-0.07 INS.

-0.08 INS.

H-G-3

MSGT HEARN BLDG 500 SVC FMT 1443 UNCLASSIFIED

MEAN STATION PRESSURE AND DEPARTURE FROM MEAN FOR FEB		OFFUTT AFB NE.	
00L M 28.919 D -.004	06L M 28.919 D .004	12L M 28.928 D .013	18L M 28.950 D -.015
01L M 28.920 D .005	07L M 28.923 D .028	13L M 28.912 D -.003	19L M 28.907 D -.008
02L M 28.919 D .003	08L M 28.934 D .019	14L M 28.898 D -.017	20L M 28.910 D -.005
03L M 28.915 D .000	09L M 28.939 D .023	15L M 28.895 D -.020	21L M 28.913 D -.002
04L M 28.912 D -.003	10L M 28.943 D .028	16L M 28.892 D -.024	22L M 28.916 D .001
05L M 28.914 D -.001	11L M 28.943 D .028	17L M 28.894 D -.021	23L M 28.913 D .002

MONTHLY MEAN 28.915

PERIOD OF REPORT 1/ 1/51 - 30/ 4/67
 NUMBER OF OBSERVATIONS USED 7220
 DATE PREPARED 26 JANUARY 1971

DATE 012671

MSST HEADW 400 500 3VC EXT 4001 UNCLASSIFIED

DEPARTURE OF STATION PRESSURE FROM MEAN BY HOUR

FCP FEE

OFFUTT AFB NB.

LOCAL STANDARD TIME

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.

+0.29 INS.

+0.03 INS.

+0.07 INS.

+0.06 INS.

+0.05 INS.

+0.04 INS.

+0.03 INS.

+0.02 INS.

+0.01 INS.

00 INS.

-0.01 INS.

-0.02 INS.

-0.03 INS.

-0.04 INS.

-0.05 INS.

-0.06 INS.

-0.07 INS.

-0.08 INS.

II-G-5

25.92

OFFUTT AFB NB.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR MAR

00L	M 28.859	06L	M 28.862	12L	M 28.856	18L	M 28.827
	D .008		D .012		D .007		D -.023
01L	M 28.860	07L	M 28.866	13L	M 28.844	19L	M 28.934
	D .010		D .016		D -.006		D -.016
02L	M 28.859	08L	M 28.875	14L	M 28.828	20L	M 28.842
	D .009		D .023		D -.022		D -.008
03L	M 28.856	09L	M 28.875	15L	M 28.824	21L	M 28.843
	D .005		D .025		D -.027		D -.001
04L	M 28.852	10L	M 28.877	16L	M 28.819	22L	M 28.855
	D .002		D .027		D -.032		D .005
05L	M 28.856	11L	M 28.871	17L	M 28.820	23L	M 28.857
	D .006		D .021		D -.031		D .007

MONTHLY MEAN 28.850

PERIOD OF REPORT 1/ 1/51 - 30/ 4/57
 NUMBER OF CPSEVATIONS USED 7853
 DATE PREPARED 26 JANUARY 1971

DATE 012671

MSCT MEAN FLG FOR PVC EXT 1441 UNCLASSIFIED

DEPARTURE OF STATION PRESSURE FROM MEAN BY HOUR
FOR MAR

OFFUTT AFB NE LOCAL STANDARD TIME
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.
+0.09 INS.
+0.08 INS.
+0.07 INS.
+0.06 INS.
+0.05 INS.
+0.04 INS.
+0.03 INS.
+0.02 INS.
+0.01 INS.
00 INS.
-0.01 INS.
-0.02 INS.
-0.03 INS.
-0.04 INS.
-0.05 INS.
-0.06 INS.
-0.07 INS.
-0.08 INS.

II-G-7

29.85

OFFUTT AFB NE.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FCR APR

00L	M 28.814	00L	M 28.815	12L	M 28.814	18L	M 28.772
	D -.003		D .014		D .013		D -.029
01L	M 28.804	07L	M 28.825	13L	M 28.831	19L	M 28.775
	D -.004		D .025		D .501		D -.025
02L	M 28.800	08L	M 28.828	14L	M 28.728	20L	M 28.727
	D -.001		D .028		D -.013		D -.014
03L	M 28.800	09L	M 28.930	15L	M 28.779	21L	M 28.795
	D -.001		D .029		D -.022		D -.006
04L	M 28.800	10L	M 28.831	16L	M 28.769	22L	M 28.803
	D -.001		D .031		D -.031		D .002
05L	M 28.805	11L	M 28.926	17L	M 28.758	23L	M 28.804
	D .004		D .025		D -.033		D .002

MONTHLY MEAN 28.801

PERIOD OF REPORT 1/ 1/51 - 30/ 4/57
NUMBER OF OBSERVATIONS USED 7676
DATE PREPARED 26 JANUARY 1971

NOT REPRODUCIBLE

MSCT WFOON PLNO 500 RVC FXT 1441 UNCLASSIFIED

DATE 012671

DEPARTURE OF STATION PRESSURE FROM MEAN 4V HOUR
FOR APR

LOCAL STANDARD TIME

OFFUTT AFB NB.

ON 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.

+0.09 INS.

+0.08 INS.

+0.07 INS.

+0.06 INS.

+0.05 INS.

+0.04 INS.

+0.03 INS.

+0.02 INS.

+0.01 INS.

00 INS.

-0.01 INS.

-0.02 INS.

-0.03 INS.

-0.04 INS.

-0.05 INS.

-0.06 INS.

-0.07 INS.

-0.08 INS.

II-G-9

NOT REPRODUCIBLE

MSGT HEATH BLOC 500 SVC EXT 14001 UNCLASSIFIED

DATE 012671

OFFUTT AFB NE.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FCF MAY

00L	M 26.801	06L	M 26.821	12L	M 28.812	18L	M 28.769
	D .001		D .020		D .012		D -.031
01L	M 29.802	07L	M 28.831	13L	M 28.800	19L	M 29.759
	D .002		D .031		D .000		D -.031
02L	M 28.801	08L	M 28.831	14L	M 28.732	20L	M 29.776
	D .010		D .030		D -.009		D -.024
03L	M 28.802	09L	M 28.829	15L	M 28.782	21L	M 28.797
	D .002		D .029		D -.018		D -.013
04L	M 28.804	10L	M 28.828	16L	M 29.773	22L	M 28.797
	D .004		D .028		D -.027		D -.003
05L	M 28.810	11L	M 26.824	17L	M 28.769	23L	M 28.800
	D .010		D .024		D -.032		D .000

MONTHLY MEAN 28.800

PERIOD OF REPORT 1/ 1/51 - 30/ 4/67
NUMBER OF OBSERVATIONS USED 7648
DATE PREPARED 26 JANUARY 1971

NOT REPRODUCIBLE

MSCT HEARN PLDG 500 PVC EXT 444 UNCLASSIFIED

DATE 012671

DEPARTURE OF STATION PRESSURE FROM MEAN PV HOUR

FOR MAY

OFFUTT AFB NB.

LOCAL STANDARD TIME

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.

+0.09 INS.

+0.08 INS.

+0.07 INS.

+0.06 INS.

+0.05 INS.

+0.04 INS.

+0.03 INS.

+0.02 INS.

+0.01 INS.

29.80 00 INS.

-0.01 INS.

-0.02 INS.

-0.03 INS.

-0.04 INS.

-0.05 INS.

-0.06 INS.

-0.07 INS.

-0.08 INS.

H-G-11

MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR JUN OFFUTY AFF NS.

00L	M 28.735	06L	M 28.804	12L	M 28.800	18L	M 28.749
	D .000		D .019		D .016		D -.036
01L	M 28.768	07L	M 28.813	13L	M 28.789	19L	M 28.747
	D .003		D .029		D .005		D -.038
02L	M 28.786	08L	M 28.817	14L	M 28.778	20L	M 28.753
	D .002		D .033		D -.006		D -.031
03L	M 28.768	09L	M 28.816	15L	M 28.769	21L	M 28.765
	D .004		D .031		D -.015		D -.019
04L	M 28.790	10L	M 28.814	16L	M 28.760	22L	M 28.777
	D .006		D .030		D -.025		D -.007
05L	M 28.795	11L	M 28.811	17L	M 28.751	23L	M 28.782
	D .010		D .026		D -.033		D -.003

MONTHLY MEAN 28.784

PERIOD OF REPORT 1/ 1/51 - 30/ 4/67
 NUMBER OF OBSERVATIONS USED 7440
 DATE PREPARED 26 JANUARY 1971

MSCT MEAN FLEG FOR SVC EXT 441 UNCLASSIFIED

DATE 012671

TEMPERATURE OF STATION PRESERVED FROM MEAN FY HOUR
FOR JUN

OFFUTT AFB MO.

LOCAL STANDARD TIME

20 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+01 INS.

+02 INS.

+03 INS.

+04 INS.

+05 INS.

+06 INS.

+07 INS.

+08 INS.

+09 INS.

+10 INS.

+11 INS.

23.78

-01 INS.

-02 INS.

-03 INS.

-04 INS.

-05 INS.

-06 INS.

-07 INS.

-08 INS.

H-G-14

OFFUTT AFB NE.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR JUL

00L	M 28.635	06L	M 28.654	12L	M 28.258	18L	M 28.803
	D -.001		D .016		D .020		D -.033
01L	M 28.636	07L	M 28.654	13L	M 28.943	19L	M 28.801
	D -.000		D .028		D .008		D -.035
02L	M 28.634	08L	M 28.655	14L	M 28.834	20L	M 28.806
	D -.002		D .034		D -.002		D -.030
03L	M 28.637	09L	M 28.670	15L	M 28.624	21L	M 28.817
	D .001		D .034		D -.011		D -.019
04L	M 28.639	10L	M 28.870	16L	M 28.615	22L	M 28.828
	D .004		D .034		D -.021		D -.008
05L	M 28.644	11L	M 28.656	17L	M 28.806	23L	M 28.833
	D .008		D .032		D -.030		D -.002

MONTHLY MEAN 28.636

PERIOD OF REPORT 1/ 1/51 - 30/ 4/57
NUMBER OF OBSERVATIONS USED 7264
DATE PREPARED 26 JANUARY 1971

MSGT WEARN PLUG 500 3VC EXT 1441 UNCLASSIFIED

DATE 012671

DEPARTURE OF STATION PRESSURE FROM MEAN BY HOUR

FOR JUL

OFFUTT AFB NB.

LOCAL STANDARD TIME

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.

+0.09 INS.

+0.08 INS.

+0.07 INS.

+0.06 INS.

+0.05 INS.

+0.04 INS.

+0.03 INS.

+0.02 INS.

+0.01 INS.

26.84 1 00 INS.

-0.01 INS.

-0.02 INS.

-0.03 INS.

-0.04 INS.

-0.05 INS.

-0.06 INS.

-0.07 INS.

OFFUTT AFB ND.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR AUG

06L	M 28.837	06L	M 28.852	12L	M 28.859	18L	M 28.878
	D -.003		D .016		D .019		D -.031
07L	M 28.833	07L	M 28.868	13L	M 28.847	19L	M 28.803
	D -.001		D .026		D .008		D -.037
08L	M 28.838	08L	M 28.869	14L	M 28.837	20L	M 28.812
	D -.002		D .030		D -.003		D -.028
09L	M 28.840	09L	M 28.871	15L	M 28.826	21L	M 28.821
	D -.000		D .032		D -.013		D -.016
10L	M 28.841	10L	M 28.874	16L	M 28.816	22L	M 28.830
	D .002		D .034		D -.024		D -.009
11L	M 28.846	11L	M 28.870	17L	M 28.814	23L	M 28.835
	D .007		D .030		D -.026		D -.004

MONTHLY MEAN 28.840

PERIOD OF REPORT 1/ 1/51 - 30/ 4/57
NUMBER OF OBSERVATIONS USED 7316
DATE PREPARED 28 JANUARY 1971

MSGT WEARN 3106 500 2VC FXT 2441 UNCLASSIFIED

DATE 012671

DEPARTURE OF STATION PRESSURE FROM MEAN BY HOUR

OFFUTT AFB NB.
01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

FCF AUC

LOCAL STANDARD TIME

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

01 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

OFFUTT AFB NE.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR SEP

00L	M 28.887	06L	M 28.899	12L	M 28.886	18L	M 28.839
	D -.004		D .016		D .015		D -.032
01L	M 28.860	07L	M 28.898	13L	M 28.871	19L	M 28.839
	D -.005		D .027		D -.000		D -.032
02L	M 28.871	08L	M 28.903	14L	M 28.859	20L	M 28.852
	D .001		D .032		D -.011		D -.019
03L	M 28.873	09L	M 28.905	15L	M 28.848	21L	M 28.856
	D .002		D .035		D -.023		D -.013
04L	M 28.874	10L	M 28.906	16L	M 28.837	22L	M 28.865
	D .004		D .037		D -.034		D -.006
05L	M 28.880	11L	M 28.902	17L	M 28.839	23L	M 28.867
	D .009		D .031		D -.032		D -.004

MONTHLY MEAN 26.871

PERIOD OF REPORT 1/ 1/51 - 30/ 4/67
NUMBER OF OBSERVATIONS USED 7072
DATE PREPARED 26 JANUARY 1971

MSGT HEADR HLDS 500 3VC FXT 1441 UNCLASSIFIED

DATE 012671

DEPARTURE OF STATION PRESSURE FROM MEAN 9V HOUR
FOR SEP

OFFCUT 4F3 HB.

LOCAL STANDARD TIME

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.

+0.00 INS.

+0.09 INS.

+0.07 INS.

+0.06 INS.

+0.05 INS.

+0.04 INS.

+0.03 INS.

+0.02 INS.

+0.01 INS.

28.87 00 INS.

-0.01 INS.

-0.02 INS.

-0.03 INS.

-0.04 INS.

-0.05 INS.

-0.06 INS.

-0.07 INS.

-0.08 INS.

OFFUTT AFB NE.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR CCT

00L	M 28.900	06L	M 28.912	12L	M 28.909	18L	M 28.873
	D .002		D .014		D .011		D -.025
01L	M 28.902	07L	M 28.919	13L	M 28.898	19L	M 28.891
	D .004		D .021		D -.010		D -.017
02L	M 28.901	08L	M 28.929	14L	M 28.875	20L	M 28.837
	D .003		D .031		D -.023		D -.011
03L	M 28.901	09L	M 28.930	15L	M 28.870	21L	M 28.893
	D .003		D .032		D -.028		D -.006
04L	M 28.901	10L	M 28.931	16L	M 28.865	22L	M 28.896
	D .002		D .033		D -.033		D .000
05L	M 28.906	11L	M 28.930	17L	M 28.865	23L	M 28.899
	D .008		D .032		D -.033		D .001

MONTHLY MEAN 28.898

PERIOD OF REPORT 1/ 1/51 - 30/ 4/67
NUMBER OF OBSERVATIONS USED 7291
DATE PREPARED 26 JANUARY 1971

MSGT HEARPS 3806 500 ZVC EXT 7443 UNCLASSIFIED

DATE 312671

DEPARTURE OF STATION PRESSURE FROM YEAR BY HOUR

FCP CCI
LOCAL STANDARD TIME

OFFUTT AFB NS

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.

+0.09 INS.

+0.03 INS.

+0.07 INS.

+0.06 INS.

+0.05 INS.

+0.04 INS.

+0.03 INS.

+0.02 INS.

+0.01 INS.

20.90 00 INS.

-0.01 INS.

-0.02 INS.

-0.03 INS.

-0.04 INS.

-0.05 INS.

-0.06 INS.

-0.07 INS.

-0.08 INS.

MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR NOV OFFUTT AFB NB.

00L	M 28.909 D .002	06L	M 28.914 D .007	12L	M 28.911 D .004	18L	M 28.900 D -.017
01L	M 28.907 D .000	07L	M 28.912 D .012	13L	M 28.932 D -.014	19L	M 28.993 D -.006
02L	M 28.909 D .002	08L	M 28.927 D .020	14L	M 28.878 D -.028	20L	M 28.902 D -.004
03L	M 28.907 D .000	09L	M 28.931 D .024	15L	M 28.379 D -.028	21L	M 28.906 D -.000
04L	M 28.905 D -.001	10L	M 28.935 D .028	16L	M 28.879 D -.027	22L	M 28.910 D .004
05L	M 28.909 D .003	11L	M 28.929 D .023	17L	M 28.932 D -.025	23L	M 28.911 D .004

MONTHLY MEAN 28.907

PERIOD OF REPORT 1/ 1/51 - 30/ 4/57
NUMBER OF OBSERVATIONS USED 7080
DATE PREPARED 26 JANUARY 1971

DATE 01267

MSGT HEADN RLOG 500 2VC EXT 1441 UNCLASSIFIED

DEPARTURE OF STATION PRESSURE FROM MEAN BY HOUR
FOR NOV

OFFUTT AFB NS.
LOCAL STANDARD TIME
20 21 22 23 24 25 26 27 28 29 30 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+.10 INS.
+.09 INS.
+.08 INS.
+.07 INS.
+.06 INS.
+.05 INS.
+.04 INS.
+.03 INS.
+.02 INS.
+.01 INS.
20.91 00 INS.
-.01 INS.
-.02 INS.
-.03 INS.
-.04 INS.
-.05 INS.
-.06 INS.
-.07 INS.
-.08 INS.

OFFUTT AFB MO.
MEAN STATION PRESSURE AND DEPARTURE FROM MEAN
FOR DEC

00L	M 28.935	06L	M 28.928	12L	M 28.928	18L	M 28.919
	D .008		D .001		D .001		D -.008
01L	M 28.932	07L	M 28.932	13L	M 28.903	19L	M 28.928
	D .004		D .005		D -.018		D .001
02L	M 28.933	08L	M 28.938	14L	M 28.897	20L	M 28.931
	D .005		D .010		D -.030		D .003
03L	M 28.930	09L	M 28.945	15L	M 28.901	21L	M 28.933
	D .003		D .018		D -.027		D .006
04L	M 28.928	10L	M 28.953	16L	M 28.904	22L	M 28.935
	D .000		D .026		D -.023		D .008
05L	M 28.924	11L	M 28.947	17L	M 28.910	23L	M 28.938
	D -.003		D .020		D -.017		D .011

MONTHLY MEAN 28.927

PERIOD OF REPORT 1/ 1/51 - 30/ 4/57

NUMBER OF OBSERVATIONS USED 7316

DATE PREPARED 26 JANUARY 1971

DATE 01267

MSGT HEARN BLDG 500 ZVC FYI 441 UNCLASSIFIED

DEPARTURE OF STATION PRESSURE FROM MEAN BY HOUR

FOR DEC

LOCAL STANDARD TIME

OFFUTT AFB NB.

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23

+0.10 INS.

+0.09 INS.

+0.08 INS.

+0.07 INS.

+0.06 INS.

+0.05 INS.

+0.04 INS.

+0.03 INS.

+0.02 INS.

+0.01 INS.

00 INS.

-0.01 INS.

-0.02 INS.

-0.03 INS.

-0.04 INS.

-0.05 INS.

-0.06 INS.

-0.07 INS.

-0.08 INS.

H-G-25

26.93

PART III
WEATHER REGIMES

SECTION A	WINTER	III-A-1
SECTION B	SPRING	III-B-1
SECTION C	SUMMER	III-C-1
SECTION D	FALL	III-D-1

SECTION A WINTER

Polar and Arctic air masses dominate over Nebraska during winter. Flying weather deteriorates in low clouds, snow and fog as cyclonic storms and cold frontal weather move through the area normally alternating with generally fair, cold highs. Approximately 25% of the winter ceilings and visibilities fall below 3000 \pm 3 with 12% below 1000 \pm 2.

Cold fronts move south or southeast with the cold air boundary while remaining nearly stationary from the Nebraska panhandle northwest into Idaho. The cold front usually brings a narrow east-west band of clouds with strong north or northwest winds and good visibility except in occasional snowshowers.

Low systems which bring the worst weather are of two types. The first develops in the lee of the Rockies and moves south-east. The second, and often the more severe, develops and tracks east from Colorado. Fast moving storms and those which move north of Offutt normally do not cause very poor weather, while slower moving systems passing to the south can produce freezing precipitation and heavy snows as Gulf moisture becomes available. See Figure 1.

The severity of both storms is highly dependent upon the location and duration of the high pressure cell over the southeast U.S. which advects moisture-laden air from the Gulf up the Missouri River valley. The associated upper level trough contributes to the storm's intensity when it "digs" southward and

moves slowly eastward over the surface low and, with moisture present, develops a thick nimbostratus with heavy snowfalls just east of the trough.

Occasionally, the Nebraska area will experience snow under a continental high either from low level stratocumulus or from westerly flow over-running the cold dome. In the latter, cloud bases are usually above 3000ft. Stratocumulus with bases of one to three thousand feet often forms in the northwest flow behind cold fronts when winds in excess of twenty knots create sufficient turbulent mixing. The stratocumulus also tends to form one to three hours after sunrise and dissipate shortly after sunset. Most likely, heating or its cessation affects the stability of the boundary layer and hence, mixing.

Winter fogs are usually of a radiation type, forming in the early morning near sunrise, in the calm or light southeast flow of a high which has just moved east of Offutt. These fogs, being local in extent or confined to the river areas, normally last only a few hours after sunrise. Less frequent, but more widespread and persistent fogs, develop when a stationary north-south oriented front to the west traps saturated southerly flow. After initial cooling and formation, the heavy fog and stratus may last for a week or more and usually requires the front to pass to the east of the station to relieve the situation.



Mean Winter Cyclone tracks affecting the Offutt area (after Bowie and Weightman)

Cyclones in Case 1 normally develop under an upper level short wave moving along the station by Arctic front in the lee of the Rockies. Cyclogenesis in Case 2 usually occurs under a strong eastward moving trough.

Figure 1

III-4-3

NOT REPRODUCIBLE

SECTION B SPRING

In this transition period, the mean position of the polar front begins to move northward yielding more frequently to the tropical Gulf air. As the season progresses, maritime polar air begins to cross the Rockies, replacing the drier continental air. Cyclonic storms are still significant with flying weather improving steadily. Early spring's visibilities and ceilings are as poor as winter values decreasing to 6% and 4% below 1000 & 2 for April and May respectively.

As warmer Gulf air becomes available, rain and freezing precipitation increase and are often mixed with snow. The warmer air also lowers stability values and thunderstorms increase from one day in March to four in April and eight in May. These storms, which may be frontal or over-running, contribute to higher precipitation totals for spring and summer.

Fog is not widespread during this season although it may form in moist air that has had restricted heating the day before. Clear skies and light gradients aid this fog situation and are not uncommon. A low stratus may form in light southerly flow where cooling is not sufficient and winds are too strong for fog.

SECTION C SUMMER

The summer months are dominated by maritime tropical air from the Gulf of Mexico. This air is displaced two or three times a month by maritime polar air which has moved across the Rockies and then eastward behind a weak cold front. At irregular intervals, continental polar air pushes south into the area, but as a rule, quickly retreats northward.

The only prolonged periods of IFT weather occur with lows which form to the southwest along an east-west stationary polar front. As the low moves into the Oklahoma, Kansas area, low stratus ceilings, reduced visibilities in pre-warm frontal fog, and light continuous precipitation will persist as the low moves from the panhandle to eastern Missouri.

Thunderstorms, reaching a peak frequency of ten days per month in June, bring perhaps the most hazardous weather of any season. Almost all thunderstorms are frontal with air mass storms being rare. Thunderstorms caused by over-running usually display little organization and often develop over large areas in less than an hour, lasting for periods of six hours or more. In contrast, cold frontal or squall line storms can usually be tracked by radar at a distance as they develop to the west. They normally move through the Offutt vicinity in one or two hours. These storms tend to intensify just east of Offutt where moisture values increase in the southerly flow from the Gulf.

III-C-1

NOT REPRODUCIBLE

SECTION D FALL

Summer synoptic patterns continue over Nebraska during September and the early part of October with maritime tropical air masses receding slowly southward. During October, relatively dry and stable maritime polar highs move into Nebraska following weak troughs with excellent flying weather continuing for several days. The first significant incursions of continental polar air occur in November with frontal structures becoming more defined and assuming more regularity of movement.

The main cause of unfavorable flying weather in the fall is low pressure systems passing to the south of the station. Occurrences of rain are most prevalent with rain changing to snow or rain and snow mixed becoming predominant during the latter part of the season.

Another cause of poor flying weather is radiation fog, becoming more frequent in October and November. A typical case of radiation fog occurs as the return circulation around a high brings light southeast winds up the Missouri River valley. Another case is a weakening maritime front moving in from the northwest with a substantial rain pattern and either riding aloft over Offutt or washing out in the local area. Both situations are preceded by restrictive daylight heating, increasing dew points, and very light winds after sunset. Precipitation may or may not precede the fog formation, but clearing at sunset is normal before fog formation.

III-D-1

NOT REPRODUCIBLE

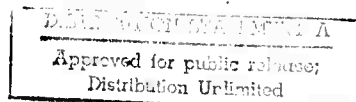
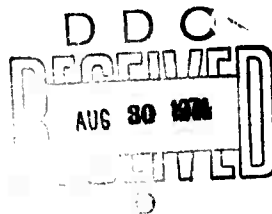
TERMINAL FORECAST REFERENCE FILE

PART IV

LOCAL AREA AND TERMINAL FORECAST STUDIES

PAGE

SECTION A FORECAST STUDIES IV-A-1



AN OBJECTIVE TECHNIQUE FOR
PREDICTING PRECIPITATION TYPE
AT OFFUTT AIR FORCE BASE

by

DAVID L. NELSON, Capt, USAF



JULY 1971

BASE WEATHER DIVISION

OFFUTT AFB, NEBRASKA

I. Acknowledgement

The author wishes to gratefully acknowledge Lt Col Dale Rogers, Chief, Climatology Branch, Aerospace Sciences Division, 3d Weather Wing, for his continual support and encouragement in this project. He performed all of the data processing; providing the author with the completed product. Without his suggestions and programming support, this paper would not have been possible.

II. General

The forecasting of precipitation type at Offutt Air Force Base has been a long standing problem. Several forecast aids have been provided by scientific services personnel which relate probability of frozen/liquid forms of precipitation to various thickness/temperature values from soundings or prog charts. The two used previously at this station were Hilworth (1) and Wagner (2). Both studies were prepared for precipitation type over a large geographical area and not specifically designed for this airfield. The acquisition of a RAOB history tape for Omaha, Nebraska offered a unique opportunity to make a detailed analysis on various parameters from a local sounding and relate these values to precipitation type at Offutt.

III. Data

Two data sources were necessary to relate upper air and surface parameters. The RAOB tape for Omaha, Nebraska was used for upper level thicknesses and temperatures and the surface data tape for Offutt AFB was used for determining precipitation type and surface temperature at RAOB release time. The Omaha RAOB station is seventeen miles north of the airfield and is considered representative of the air mass affecting Offutt. The period of record used was October to April only from 1957 through 1967.

IV. Procedures

The approach taken in this study was the "perfect forecast" assumption. Precipitation type near the sounding time was related to RAOB parameters. Specifically, 00Z and 12Z soundings were available and surface observations within three hours of the RAOB time were used to categorize precipitation type. The types considered were: hail, snow, sleet, freezing precipitation, rain, rain and snow mixed, and snow showers. Rain and snow mixed was also counted as a rain occurrence and a snow occurrence, and snow showers were also counted as a snow occurrence.

Several schemes were tried relating various parameters in order to get the best discrimination in the data. Surface temperature and the 950MB temperature were both related to five thickness values (1000-500, 1000-700, 1000-850, 850-500, and 850-700MBs). Two other schemes were attempted relating 1000-850MB thickness to the 850-700MB thickness and the 900MB temperature versus the 850-950MB temperature difference. Each scatter diagram was analyzed for data discrimination with the goal being to isolate the most cases with 98 percent reliability.

V. Results

The scatter diagram which produced the best shred was the 1000-700MB thickness versus surface temperature. To repeat, the best shred was defined to mean the scatter diagram which isolated the most number of cases with 98 percent reliability. The results are shown in figure 1. Raw data figures are provided for information to assist the user in making value judgments on the reliability of each area. Due to the relatively small number of freezing precipitation occurrences, 98 percent reliability was not possible in this area. However, due to the operational significance of this area, the area was delineated such that it included the most occurrences of freezing precipitation possible without diluting the reliability. This area forecasts 50 percent of all freezing precipitation occurrences with 74 percent reliability. Again, the raw data figures will assist the user.

The investigator was now faced with the central area where data types overlapped and no one type of precipitation was clearly dominant. The data points which fell in this area were processed by all the remaining schemes which were used for the original data with few encouraging results. So few data points were isolated by any one scheme that further study was discontinued. Based on several years experience as a Chief Forecaster, it was also determined that the scheme would get more utilization if it was kept simple and easy to use. The overlap area was then analyzed by a most probable or best forecast scheme with the results shown in figure 2. As shown, a rain and snow mixed area was delineated as a "best forecast". This phenomena did not dominate the area, but 80 percent of the occurrences of rain and snow mixed did fall in this area and there is almost equal probability of rain or snow. As a reminder, the 50 cases of mixed are included as a rain and a snow occurrence such that realistic numbers are: snow 73, rain 112, and mixed 50. The forecast of mixed will then verify about 20 percent of the time, but in this investigator's opinion, it is the "most reasonable" forecast.

PRECIPITATION TYPE AS A FUNCTION OF 1000-700MB THICKNESS AND SURFACE TEMPERATURE

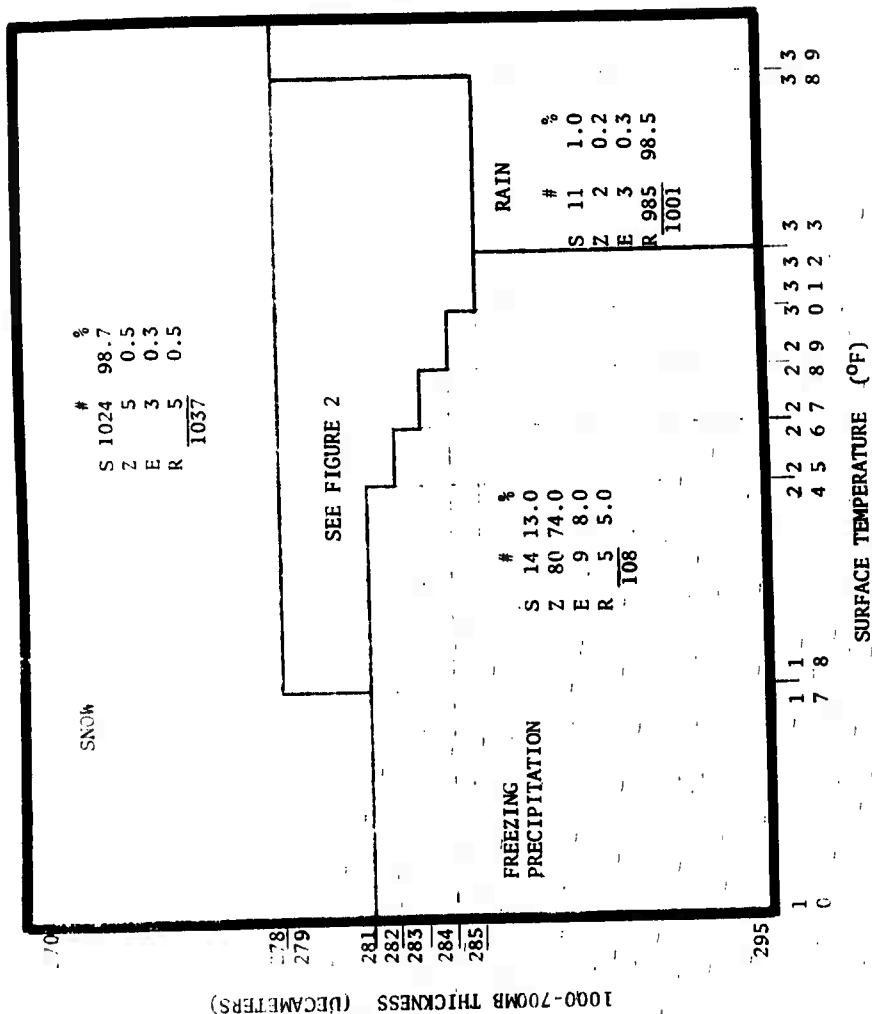


FIGURE 1

PRECIPITATION TYPE AS A FUNCTION OF 1000-700MB THICKNESS AND SURFACE TEMPERATURE

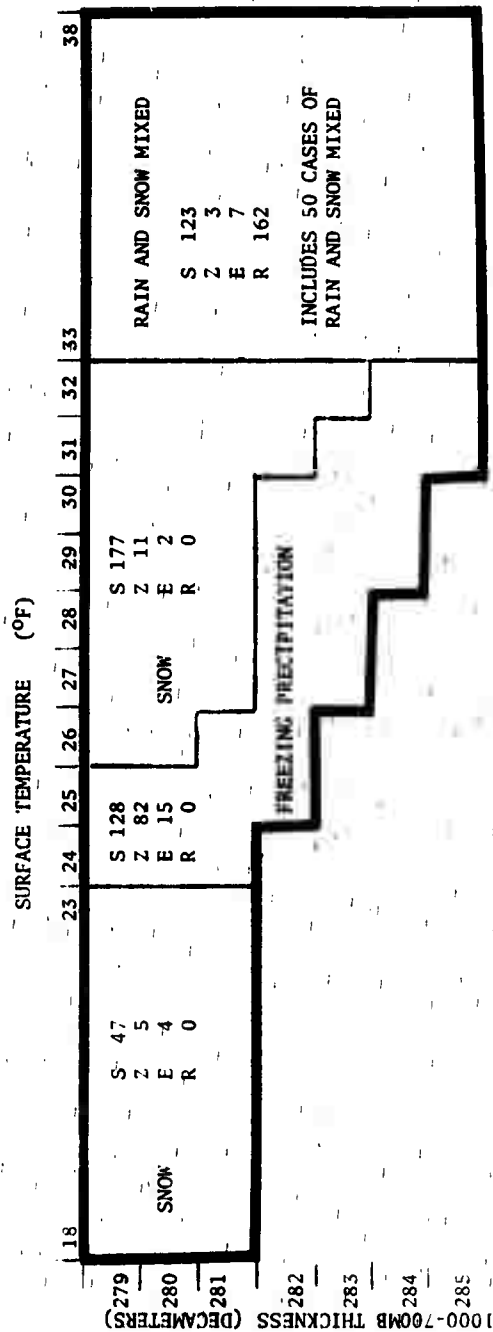


FIGURE 2
IV-A-5

The remaining area was delineated by a "best forecast" technique. Care must be taken in this area because of the high frequency of occurrence of all phenomena. Raw data figures are provided to assist the user. Since the entire area is at or below freezing on the surface, occurrences of rain were included as freezing precipitation. Freezing precipitation versus rain will then be a function of temperature trend (i.e. is the temperature going above or below freezing with time?). This judgment can be made at the time of the forecast. One will notice that the "best forecast" is not the "most probable" in the case of freezing precipitation. Freezing precipitation, however, has a much greater operational significance than snow, and even though this is a technical paper, it is to be an "operational forecast aid". The two freezing precipitation areas (figures 1 and 2) forecast 85 percent of all occurrences of this hazardous phenomenon and is considered justified because the forecaster will be correct almost 50 percent of the time. In the case of freezing precipitation, a high prefigurance was deemed more important than post agreement.

VI Statistics

Using figures 1 and 2, the following table can be constructed using the dependent data in the study:

			FORECAST			
			E	R	M	T
OBSERVED	S	Z	0	5	73	1465
	S 1245	142	0	2	3	188
	Z 21	162	0	3	7	43
	E 9	24	0	979	112	1098
	R 2	5	0	6	50	59
	M 3	0	0	995	245	2853
T 1280 333			0	995	245	2853

NOTE: For the above table, rain/snow mixed was deleted from rain and snow occurrences such that data are not reflected twice.

As can be seen, this table produces an 85 percent correct forecast using the proposed scheme. The Skill Score which results is 0.77 explaining 59 percent of the variance. It must be remembered, however, that a high Skill Score was not the only goal as was explained in the freezing precipitation and rain/snow mixed areas in figure 2. The goal was also to predict hazardous weather and make the most reasonable operational forecast.

VII Verification

This study was tested on an independent data sample from October 1968 through April 1969. The frequency of occurrence of precipitation types was similar to the dependent data sample and the results should then be representative. The test rules were exactly the same as were for the original study. The following table depicts the results:

		FORECAST					
		S	Z	E	R	M	T
OBSERVED	S	133	21	0	2	20	176
	Z	2	33	0	0	0	35
	E	1	4	0	1	1	7
	R	2	1	0	136	24	163
	M	2	0	0	1	6	9
	T	140	59	0	140	53	392

Percent Correct = $308/392=78.6$

Skill Score = $(308-128)/(392-128)=0.68$

These results may appear disappointing and they tempted this investigator to search for a "better" independent sample. There are, however, some encouraging facts in the table. First, the verification was lowered for two reasons: the relatively high occurrence of snow in the forecast freezing precipitation column and the high occurrence of rain or snow in the rain/snow mixed column. The first cause can be easily rationalized by noting that this study may overforecast freezing precipitation but it did forecast 94 percent of all freezing precipitation occurrences. If you'll recall, that was my intention. The second cause can also be rationalized; 67 percent of the mixed occurrences were correctly forecast and the frequency of occurrence of pure rain or pure snow is almost equal. The second interesting feature is the accuracy of pure rain/pure snow forecasts. A forecast of rain verified 97 percent and a forecast of snow verified 95 percent.

VIII Conclusion

The high percent of freezing precipitation observations which were correctly forecast and the high rain/snow forecast verification rate makes this study informative and useful. It should be incorporated into the forecast routine for the determination of forecast precipitation type.

IX References

(1) Schafer, R.J., et al: "Further Studies in the Development of Short Range Weather Prediction Techniques", Scientific Report No. 1, Eastern Air Lines, Inc., Contract No. AF19(604)-2073, April 1958, pp.158-169.

(2) Wagner, A. James: "Mean Temperature from 1000MB to 500MB as a Predictor of Precipitation Type", AFCRC-TN-57-288, May 1957.